REPORT

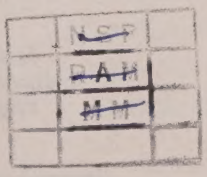
OF THE

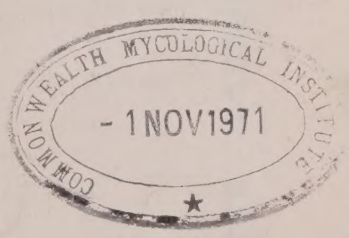
DIRECTOR-GENERAL OF FORESTS

FOR THE YEAR ENDED

31 MARCH 1971

Presented to the House of Representatives
Pursuant to Section 68 of the Forests Act 1949





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THE DIRECTOR-GENERAL OF FORESTS

to the Hon. D. MACINTYRE, Minister of Forests

Wellington, 1 July 1971.

SIR,

I have the honour to present, pursuant to section 68 of the Forests Act 1949, the annual report of the operations of the New Zealand Forest Service for the year ended 31 March 1971.

I have, etc.

A. P. THOMSON, Director-General of Forests.

Hon. D. MACINTYRE,
Minister of Forests,
Wellington.

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STATISTICAL SUMMARY—IMPERIAL MEASURE

Category	Year Ended 31 March	
	1970	1971
New Zealand Forest Service		
Forest revenue	$21,565,388	$23,848,023
Net cost of forest administration	$3,730,011	$5,181,547
Total area of State forest land	10,110,158 acres	10,143,476 acres
State exotic forests—		
Total stocked area	699,951 acres	728,946 acres
Planted during year	36,538 acres	36,416 acres
Areas restocked during year	5,318 acres	8,899 acres
Clear felled during year	9,877 acres	10,884 acres
Net increase in stocked area	30,864 acres	28,995 acres
Roundwood removed from State forests—		
Indigenous	16.3 million cu ft	19.0 million cu ft
Exotic	95.5 million cu ft	106.2 million cu ft
Total	111.8 million cu ft	125.2 million cu ft
Sawn timber produced*	54.2 million bd ft	55.3 million bd ft
New Zealand		
Area of exotic production forests	1,333,000 acres†	1,379,000 acres†
Net increase in stocked exotic area during year	44,000 acres‡	49,500 acres‡
Roundwood removed from all forests—		
Indigenous	36.5 million cu ft	35.8 million cu ft
Exotic	239.5 million cu ft	253.6 million cu ft
Total	276.0 million cu ft	289.4 million cu ft
Number of registered sawmills	510	457
Sawn timber production—		
Indigenous	197.3 million bd ft	187.9 million bd ft
Exotic	567.7 million bd ft	596.4 million bd ft
Total	765.0 million bd ft	784.3 million bd ft
Sawn timber treated	301.9 million bd ft	N.A.
Paper production	438,953 tons	454,586 tons
Wood-based panel production (estimated surface area)	182 million sq ft	192 million sq ft
Value of imports of forest products* (c.i.f.)	$20,821,000	$26,868,000
Value of exports of forest products* (f.o.b.)	$60,945,000	$71,235,000

*Calendar Year †Estimated. ‡Provisional. N.A. Not Available.

STATISTICAL SUMMARY—METRIC MEASURE

Category	Year Ended 31 March 1970	Year Ended 31 March 1971
New Zealand Forest Service		
Forest revenue	$21,565,388	$23,848,023
Net cost of forest administration	$3,730,011	$5,181,547
Total area of State forest land	4,091,581 ha	4,105,065 ha
State exotic forests—		
Total stocked area	283,270 ha	295,004 ha
Planted during year	14,787 ha	14,738 ha
Areas restocked during year	2,152 ha	3,601 ha
Clear felled during year	3,997 ha	4,405 ha
Net increase in stocked area	12,491 ha	11,734 ha
Roundwood removed from State forests—		
Indigenous	461 thousand m^3 (r)	538 thousand m^3 (r)
Exotic	2,703 thousand m^3 (r)	3,005 thousand m^3 (r)
Total	3,164 thousand m^3 (r)	3,543 thousand m^3 (r)
Sawn timber produced*	128 thousand m^3 (s)	131 thousand m^3 (s)
New Zealand		
Area of exotic production forests	539,000 ha†	558,000 ha†
Net increase in stocked exotic area during year	17,800 ha‡	18,700 ha‡
Roundwood removed from all forests—		
Indigenous	1,033 thousand m^3 (r)	1,013 thousand m^3 (r)
Exotic	6,778 thousand m^3 (r)	7,177 thousand m^3 (r)
Total	7,811 thousand m^3 (r)	8,190 thousand m^3 (r)
Number of registered sawmills	510	457
Sawn timber production—		
Indigenous	466 thousand m^3 (s)	443 thousand m^3 (s)
Exotic	1,339 thousand m^3 (s)	1,408 thousand m^3 (s)
Total	1,805 thousand m^3 (s)	1,951 thousand m^3 (s)
Sawn timber treated	712 thousand m^3 (s)	N.A.
Paper production	445,976 metric tons	461,859 metric tons
Wood-based panel production (estimated surface area)	16.9 million m^2	17.8 million m^2
Value of imports of forest products* (c.i.f.)	$20,821,000	$26,868,000
Value of exports of forest products* (f.o.b.)	$60,945,000	$71,235,000

*Calendar Year. †Estimated. ‡Provisional. N.A. Not Available.

NOTE—ha=hectare(s)
m^3(r)=cubic metre(s) of roundwood
m^3(s)=cubic metre(s) of sawn wood

CONVERSION FACTORS

1 acre = 0.4047 hectares
1 cubic foot = 0.0283 cubic metres
1,000 board feet = 0.424 cubic metres

FOREST POLICY AND CONSERVANCY HIGHLIGHTS

ROLE OF THE FOREST SERVICE IN EXOTIC FOREST ESTABLISHMENT

It has always been Forest Service policy to encourage planting by the private sector, although apart from the gifts of trees to schools and other minor concessions little was done to give effect to this policy until after the Second World War. The first legislative step, in 1949, made it possible for farmers to spread the income from the sale of trees over a 5-year period for purposes of tax assessment. This was followed in 1960 by amending legislation which exempted the timber value of a standing forest from estate duty. These indirect incentives, though welcomed by the farming community, did not prove to be particularly effective. Accordingly, in 1962 the forestry encouragement loan scheme was introduced, whereby suspensory loans of up to $80 per acre ($198 per hectare) for planting and maintaining woodlots were granted to bona fide farmers. This scheme did result in some increase in private planting, but it proved cumbersome to administer and had disadvantages from the landowner's viewpoint. At much the same time a similar scheme was introduced to encourage planting by local authorities.

Perhaps the most significant legislative change was the 1965 amendment to the Land and Income Tax Act, which allowed companies, for tax purposes, to deduct from current income the costs of forest establishment and management. This enactment provided a major incentive for forest-based industries to embark on new afforestation schemes or to expand existing ones.

In 1970 the forestry encouragement grants scheme was introduced. As indicated in last year's annual report, it provided for grants amounting to 50 percent of qualifying costs and was available not only to farmers but also to all individuals, as well as to trusts and to small forestry companies. It was designed to give the private person and the small company no less an incentive than was already available to the larger forest industries.

The results of the last two measures have exceeded all expectations. Together with the further incentive given by high prices for export logs, they have resulted in a spectacular increase in the rate of planting by both farmers and companies. In 1970 it is estimated that no less than 28,400 acres (11,490 ha) of new planting has been carried out by the private sector, more than double the figure of 5 years ago, and indeed more than the total of State and private planting as recently as 1963. Nothing could demonstrate more convincingly the faith which the forest industry has in the future of its markets and in the economic viability of forestry as a form of land use. It is quite apparent that forest industries have appreciated that the healthy expansion of their enterprises depends on a reliable supply of raw material; that they have examined the world market situation for wood and know that it is a commodity which can be shipped profitably from New Zealand to many parts of the world in either a crude or a processed form; that they can see the bottom of the deep mines of virgin timber which hitherto have supplied the work with this basic raw material; and that they know well that New Zealand can grow wood on a renewable basis as cheaply or more cheaply than other possible competitors.

Under these circumstances it is timely to reconsider both the national planting target and the role which the Forest Service should play in achieving it. The present targets, approved by both the Forestry Development Conference and the National Development Council, are for 52,000 acres (21,044 ha) of new area planting (representing on average a net gain in total forest resources of 45,000 acres or 18,200 ha), and a temporary additional programme of 5,000 acres (2,000 ha). There is an important difference in the interpretation of these approvals. The Forest Service, supported by the Forestry Development Council, considers that the current target of effectively established additional forest should be considered as merely the desirable minimum; on the other hand the National Development Council, naturally and from its point of view reasonably, interprets it as a maximum. The logical consequence of the latter interpretation is that as long as the target is being achieved, the area planted by the Forest Service can be reduced to the extent that the contribution from the private sector increases.

This philosophy, which has been propounded during the year under review, has been a cause of concern to the Forest Service and has been greeted by dismay by many sections of the community. There is a growing conviction within and outside the Forest Service, and supported by market research carried out by industry, that future markets will be so large that they should not themselves be a limiting factor in deciding planting programmes. The allocation of a correct share of the nation's capital and labour resources must of course be recognised as strictly limiting factors. Within the framework of these limitations it can be argued, particularly in the light of what must be continuing uncertainty about the future of New Zealand agriculture, that ideally planting targets should be based on one major consideration only: optimum land use.

The current planting target resulted from planning exercises which the Forest Service carried out for the Forestry Development Conference, which were summarised in *The 1969 National Forestry Planning Model.* With the assistance of the Forestry Development Council this planning is being updated and refined; it can be expected that, as a result, revised and considerably increased planting targets will be recommended.

Even if a national planting target were accepted as a maximum and it were considered desirable to reduce Forest Service planting, it would be impracticable and grossly inefficient to do so without a phasing down period. The reasons for this have to do with land acquisitions, money already spent on land preparation, the need to ensure a minimum disruption to the regular employment of labour, and the time necessary to implement amendments to carefully thought out long-term plans.

Quite apart from these considerations and because of certain minimum and unavoidable obligations there is a limit beyond which State planting should not be reduced. The State's main commitments are:

- Honouring contracts to the Maori owners of land which has been leased from them.
- Honouring contracts to keep industries supplied with given quantities of wood.
- Building up of large forest resources (if the private sector does not) in the districts that the NDC recognised as having a high priority for forest industries development.

- Developing dual- or multi-purpose forests where counter-erosion and other protection factors and scenery preservation must override profitability.

- For social reasons, maintaining communities hit by lack of alternative work opportunities.

- Establishing forests at a certain size to spread administrative and other overhead costs. (The optimisation of yields and profits depends on a spread of age classes within a forest. Abandoning or drastically curtailing half-grown forests is possible but economically wasteful.)

Assuming that these criteria for State commitments are accepted, it can be calculated that whatever the private sector plants the level of Forest Service planting should at present be no less than 30,000 acres (12,100 ha) per year.

In summary, the policy of encouraging planting by the private sector should continue. Inasmuch as there is a need to set maximum planting targets—and the constraints of capital and labour availability make this inevitable—the levels of Forest Service planting should be reduced as private planting increases, but not suddenly and not below certain inevitable minima. Accepting that future markets are not likely to be limiting—nor, except locally, is the availability of land—it is suggested that the maximum national planting target for the next few years should desirably be of the order of 80,000 acres (32,400 ha) a year. If private planting continues at its present rate, the Forest Service contribution should thus be approximately 55,000 acres (22,300 ha). Only by adopting such a programme can:

- Large concentrations of forest resources be built up in NDC priority areas.

- Legitimate local aspirations be satisfied.

- Forestry play its part in providing opportunities for rural employment where none other exist.

- Desirable programmes of production *cum* protection planting be carried out in critical catchments.

Indeed only by this planting pattern can New Zealand capitalise adequately on the advantages it has in cheap and efficient exotic forestry and can significant progress be made in achieving the stated ideal of optimum land use.

LOG EXPORT POLICY

The log export trade has brought undoubted financial benefits to the forest owner and to the nation. However, it has now reached a level which if sustained will be a threat to the supply of wood required for processing in New Zealand. The quantity of logs exported exceeded 60 million cu ft (1.7 million m^3) in 1969 and again in 1970, and the same level is expected in 1971. This volume is close to a quarter of the total quantity currently

being harvested from all forests, indigenous and exotic. Two-thirds of the logs exported come from private and company forests, and one-third from State forests.

Such a large trade in a commodity requiring little capital investment in processing has been a most valuable addition to export earnings. As local industries expand there will be the opportunity to improve export earnings by increasing the level of internal processing, whether in the form of pulp, paper, timber, panel products, or precut houses. The volume of logs exported must be drastically reduced if this desirable end is to be achieved.

Already the Forest Service plans to curtail the export of logs from State forests. It will be done in such a way as to minimise the disruption to logging and cartage contractors and to the operation of the exporting ports. The Forest Service aim is for the tonnage of logs going directly to ports to be replaced by a similar tonnage going to industries, the industries then passing on the processed product to the ports.

The larger companies are also planning to curtail log exports as their industries expand to use the wood. As a result, within a few years log exports should decline to a fraction of the present volume, though there is likely to be a continuing trade at the reduced level.

The private sector will probably continue to export logs if the return to the grower is better than prices paid by local industry, where localities lack suitable processing industries, or where there are temporary surpluses of logs. The Forest Service may maintain a small level of exports for much the same reasons. Added benefits could be the need to avoid fluctuations in log supplies to industries, and a ready market for logs which have to be salvaged quickly because of windthrow or like disasters.

KAINGAROA SALE

In May 1969 the Forest Service invited proposals for the purchase and processing, over a period of up to 20 years, of 320 million cu ft (9.0 million m^3) of standing exotic softwoods in various parcels from Kaingaroa, Whaka, and Rotoehu forests. This was a major offering of wood from the remaining uncommitted State forest resources in the Bay of Plenty. On the closing date of 30 September 1969 nine proposals were received, though two were subsequently withdrawn. The remaining seven included three which involved a relatively high level of processing of the wood under offer. Particular proposals which involved the development of new industries required special investigations into their commercial profitability and possible markets for their products; overseas consultants were engaged to assist in these preliminaries.

Subsequently an inter-departmental committee chaired by the Forest Service examined the most acceptable proposals in relation to a number of criteria. These included: net export earnings and net value of production for the domestic market; commercial profitability; national profitability and use of capital resources; level of stumpage; market flexibility; diversification of export products; introduction of new technical skills; demands on roads, ports, and the supply of electricity; extent of overseas investment; and stimulus to regional and national development. Rarely if ever has such an exhaustive economic analysis been made prior to the disposal of a major State resource.

Despite pressure from various groups to have all the wood utilised in the Bay of Plenty, the decision announced by the Minister of Forests on 1 September 1970 was to offer a large part of the wood to Carter Consolidated Ltd. to establish an integrated sawmill and refiner groundwood pulp mill near Napier, and a smaller part to Tasman Pulp and Paper Co. Ltd. in order to make it absolutely certain that this company had enough suitable wood for its projected expansion in newsprint production. A formal sale agreement was signed with Carter Consolidated Ltd. during October 1970. Signing of an agreement with Tasman must await the decision by this company to establish a third newsprint machine.

As a result of the sale, Hawke's Bay will gain a fully integrated forest products industry in 1973, much earlier than if the start-up had to await the build-up of local forest resources. At the same time the short- and medium-term development of existing industries in the Bay of Plenty will not be adversely affected, the companies concerned generally being able to command from their own forests enough raw material for their announced expansion plans.

The total production from the Napier project, with which two Japanese companies are to be associated, will be for export and will substantially increase earlier estimates of attainable levels of forest products exports. The project should stimulate further planting in Hawke's Bay by companies, local bodies, and individuals.

EFFECTS OF FINANCIAL RESTRICTIONS ON SILVICULTURE

Last year's report discussed the economic aspects of silviculture and the benefits of the timely tending of tree crops.

Should recent restrictions on finance continue the Forest Service must decide whether it is preferable to invest in planting at a high rate in order to produce large volumes of relatively low-quality wood, or to reduce plantings and channel part of the investment into pruning and thinning, thus enhancing the quality of the wood grown. For the last 2 years the Forest Service has chosen the former alternative, though with some misgivings.

If tending operations continue to be greatly reduced it follows that the object of achieving balance in grade production will be seriously prejudiced and that high-quality timber may not be continuously available, which in turn would imply that the uses for which the timber is grown may be taken over by substitutes. In contrast, the availability in quantity of timber free of gross defects and of relatively high uniform density and related strength properties will certainly encourage its uses in the developing field of timber engineering structures. Similarly, it is predictable that the present demand for long-length defect-free timber for interior and exterior building use and in manufacture will continue, provided this demand can be substantially satisfied. Any reduction in tending now would have its adverse effect at a time when indigenous timbers, on which we depend for most clear timber, will be in much shorter supply.

Superimposed on these considerations is the fact that the high financial return which can be expected from giving proper attention to tending will not be realised. Implicit in proper tending of all suitable stands is the need to maintain a schedule that is exacting both as to timing and sequence.

This dilemma between quantity and quality will not be easy to resolve, and inevitably some compromise will be necessary. The current swing of the pendulum is towards quantity, but it cannot be allowed to swing too far. Desirable tending operations are well in arrears in most forests. Once in arrears, the opportunity to produce high-grade timber is either lost or necessitates uneconomic extensions to the planned rotation. Should financial restrictions continue it will be necessary to curtail planting programmes so that, at the very least, an essential minimum of silvicultural work is carried out.

BEECH UTILISATION

Following the 1923 national forest inventory, the comment was made that "the hardwoods will function in the national timber problem only as a subsidiary source of supply, . . . because . . . they do not lend themselves readily to industrial and constructional and building uses".* Even today it is true that there is a limited demand for beech and tawa, the principal native hardwoods, as building timbers and only a modest outlet for them in other uses, but there is every indication that they will soon be in demand for industrial purposes. Current possibilities for converting beech into pulp and paper mean that a large hitherto unmerchantable volume will be usable, thus adding greatly to the available wood resource. The extent of this resource in Nelson, in Southland, and on the West Coast is currently being assessed.

Up to now the major factor restricting the management of the beeches, which are the easiest to regenerate and hence the most promising silviculturally of all indigenous species, has been the lack of demand for beech timber. Now that there is likely to be a pulp market, which will complement that for sawn timber and absorb sawmill residues, low-grade timber, defective logs, and smallwood, the successful sustained-yield management of beech appears to be economically as well as silviculturally possible. The full utilisation of the beech forests means that it could be economically feasible to convert part of the logged areas to fast-growing exotic forests. It follows that the exotic softwoods would eventually take over as the main source of raw material, but with a smaller supply of beech from continuously regenerated native forest.

Only a small proportion of the 4.7 million acres (1.9 million ha) of South Island State forests occupied by beech should ever be considered for utilisation. The great bulk of the beech area, approximately 90 percent, is mainly protection forest, playing a vital role in soil conservation and river control. These high-altitude protection forests also have immense importance by reason of their scenic beauty and the opportunities for recreation which they provide. There are also considerable areas of lower-altitude forest which should be reserved for scenery preservation or recreational reasons, to maintain habitats for native birds, to preserve permanent examples of rare and interesting plant and animal communities, and generally to maintain a healthy degree of ecological diversity.

Thus in the face of strong demands for the utilisation of beech forests, the first task of the Forest Service has been to zone or classify the forests with a view to delineating those areas which should be reserved and those which could justifiably be partially or wholly logged. This work has been put in hand, the basic categories being: protection forests (soil and

*New Zealand Official Year Book 1926, p. 450.

water conservation), amenity forests (scenery and recreation), biological reserves (bird habitats and important plant associations), and potentially productive (for use by industry). The last category has been subdivided into areas which are suitable for regeneration and sustained-yield management of beech and areas that are more suitable for conversion to faster growing exotic species.

In summary the Forest Service policy for beech forests is:

- Soil and water conservation will have first priority in land use.
- The only areas to be clear felled will be those suitable for sustained-yield forestry, either by beech regeneration or conversion to exotics.
- The forests will be managed to stimulate regional growth and maintain social stability.
- The public's use and enjoyment of the forests will be maintained and enhanced.
- Local areas of indigenous forests will be preserved, even though the presence of extensive beech forests in nearby national parks and State forest parks could be considered to remove the need for major reservations.
- All beech utilisation will operate under working plans approved by the Minister of Forests.

The Nature Conservation Council has been invited to examine and comment on the policies and criteria adopted for forest classification and to inspect the areas covered on the ground.

CONSERVANCY HIGHLIGHTS

Auckland—A total of 5,428 acres (2,197 ha) of new country was planted, of which 447 acres (181 ha) consisted of protection planting on sand forests. Labour under the winter employment scheme contributed 938 acres (380 ha) of this total. In addition, 1,189 acres (481 ha) of cut-over exotic forest was restocked.

There was a rapid rise in the stumpage value of exotic timber, due in part to the draw-off of available supplies by the export log trade. Short-term sales from Athenree and Maramarua forests and the long-term sale at Puhipuhi Forest showed increases of from 35 percent to 100 percent above previous prices. Sales of roundwood for fencing material and pulpwood continued at a healthy level, demand usually being well ahead of supply. Prices have improved, though some buyers give the impression that they are doing the Forest Service a favour by taking first thinnings, and that for this reason the prices should be nominal.

Disposal of lower grades of timber has been a continuing problem for indigenous sawmills, although the demand for better grades appears to have been satisfied. Earlier forecasts of the cut needed from State forests to satisfy the market when timber from Maori and freehold areas was exhausted have proved to be high, and consequently the life of the State indigenous production forests will be longer than previously expected.

The wider use of one-man power saws has substantially reduced the cost of land clearing on forests with steep slopes and heavy second growth or scrub. A gravity roller designed by a contractor working at Whangapoua Forest shows great possibilities for the more efficient and cheaper clearing of steep country.

An important event during the year was the ministerial decision to set aside as a forest sanctuary the 250 acres (101 ha) of mature kauri known as the Manaia block in the Coromandel Forest Park. Until recently this area has been relatively inaccessible and it was little known. Logging roads have now approached its boundary. Although many of the trees in the block are overmature and stag-headed, and had been bled for gum, there are still many magnificent specimens of large kauri trees standing. The area represents the last major remnant of the extensive and famous Coromandel kauri forest, and it is therefore of considerable historic as well as scientific value. Interested sections of the public were most concerned to have all the Manaia kauris reserved, and after full consideration of the pros and cons of complete reservation, the Forest Service supported this view. As a result, action is being taken to give the Manaia block full legal protection as a forest sanctuary under the Forests Act.

Rotorua—The Bay of Plenty continues to dominate the forestry scene, both in production and in new planting. The yield from exotic State forests again increased, rising from 65 million cu ft (1.8 million m^3) to 72 million cu ft (2.0 million m^3), double the output of 8 years ago. Rotorua Conservancy accounts for two-thirds of the volume harvested from all State exotic forests.

New areas planted by the Forest Service amounted to 10,794 acres (4,368 ha) out of a total of 16,137 acres (6,531 ha), the balance being restocking, conversion, and amenity planting. The private sector is estimated to have planted 16,100 acres (6,510 ha) of new forest and to have restocked 9,000 acres (3,640 ha). New planting in the conservancy in 1970 therefore reached almost 27,000 acres (10,920 ha), which is close to the national achievement of a mere 7 years ago. It is expected that new planting in 1971 by the major companies and other private concerns will exceed 20,000 acres (8,100 ha). The rapid upsurge in private planting has intensified competition for suitable land.

The full commitment to the Maori owners of Lake Taupo Forest was met, with over 4,000 acres (1,619 ha) being successfully established. An excellent strike was obtained, the result of thorough site preparation by discing and harrowing. There are grounds for cautious optimism that some of the harder sites in Kaingaroa can be converted to more productive species by similar attention to site preparation, thereby achieving a fivefold increment increase.

Progress with the Poverty Bay - East Cape scheme has been disappointing; the area planted this year being less than in 1969–70 (see p. 21). Land acquisition is also behind schedule.

Rising labour and plant-hire costs stress the need for greater operating efficiency to maintain the profitability of forestry. A bonus incentive scheme introduced in the two plant workshops is achieving the objective of increased production and lower costs.

Full co-operation was given to officers of the Wildlife Branch of Internal Affairs in their search for the kokako (blue wattled crow) and other rare birds. Forest Service officers reported the presence of the bird in relatively large numbers in Rotoehu Forest; this report was confirmed and as a result cutting plans at Rotoehu have been changed and areas set aside for the scientific study of the kokako.

The Nature Conservation Council visited Mamaku Forest in order to inspect clearing and conversion operations and to study the Forest

Service plans for forest zoning. Proposals to reserve areas for the purposes of soil and water conservation, recreation, scenery preservation, and preservation of scientific values were illustrated on maps and where possible demonstrated on the ground.

Wellington—By far the most significant forestry development has been the proposal to build a sawmill - pulp mill complex at Whirinaki, north of Napier (see p. 11). This step will make possible the sale of chips or chippable wood from sawmill and forest wastes from most points in the conservancy. Small logs that could never be a good sawmilling proposition should now become sought after, and forest managers should no longer have to deal with re-establishment problems brought about by large volumes of unmerchantable wood left on the forest floor.

A total of 6,404 acres (2,592 ha) of new planting was done, 500 acres (202 ha) less than last year. With restocking and replanting, close to 7,000 acres (2,833 ha) was planted.

Larger areas are now becoming due for pruning and thinning, but as less finance is available for tending the work has to be restricted to selecting the most desirable stands for maximum treatment and attempting to give the rest at least one non-commercial thinning.

Negotiations are proceeding for leasing Maori land in Hawke's Bay and south Taupo. The Forest Service must particularly concern itself with the land surrounding Lake Rotoaira, where protection will be required for canals, streams, and water storage for the Tongariro hydro scheme (see p. 18).

An area of 29,000 acres (11,736 ha) of attractive relatively unspoilt forest hill country land was bought for adding to the west side of Tararua Forest Park.

Development of the Rimutaka Forest Park began with improving the Catchpool Stream entrance and the construction of a short access road along a gorse-covered river flat to the forest entrance. For the first time there is now legal access to the start of the much-used Five Mile Track. The road also gives access to attractive picnic spots and to gorse-covered hills scheduled for planting. The greatly increased recreational activity which followed emphasised the desirability of providing essential amenities for the public in the early stages of forest park development.

Nelson—The sale of beech chips began during the year at Nelson on a small scale. No great difficulties have been experienced in logging, manufacture of chips, or apparently in processing the material in Japan, as the buyer has agreed to accept larger quantities. Enough pine and beech is now available to supply 15 shiploads a year from Nelson until 1976.

Sales of radiata pine from Golden Downs Forest during the year stipulated that provision be made for the processing of sawmill slabs, with the result that one company is installing a debarker and others have arranged to sell slabs unbarked to chip mills. It is gratifying that the major sawmillers in Waimea County are now using the whole log, apart from sawdust and bark.

The prospects of developing a major wood-using industry from the beech resources of the south Nelson and north Westland region (see p. 12) have fired the imagination of those connected with the investigation into the scheme and given new impetus to the development of forest management in the region. On areas not reserved for environmental reasons field work to assess wood resources has been completed and data processing

has reached an advanced stage. Studies of logging and roading costs are continuing.

Forest Service planting declined by 311 acres (126 ha) from the previous year's figure to 5,119 acres (2,072 ha), but private planting rose by 889 acres (360 ha) to 3,489 acres (1,412 ha). The total planted, 8,608 acres (3,484 ha), was 578 acres (234 ha) higher than in 1969. The level of planting needed to build up resources for a large wood-based industry in the future is thus being achieved. The sharp rise in private planting was due in part to the new grants scheme and in part to expanded company afforestation.

This year larger numbers of visitors than ever before walked over the popular routes in the North-west Nelson Forest Park. The Heaphy Track attracted thousands, and during the height of the summer it was not uncommon to find up to 70 people camped near huts which were themselves fully occupied.

Westland—The indigenous sawmilling industry is still struggling in the face of a waning market and strong opposition from other species and materials. However, progressive trends include the commissioning of a new band-saw mill at Whataroa, possibly the last new development in the sawmilling industry in south Westland for some years, and the prospects of large-scale utilisation of beech in north Westland (see p. 12). Several shipments of red and silver beech sawn timber were made to Japan, under contracts negotiated by the Commercial Division.

The planting allocation of 1,000 acres (405 ha) a year is not as large as protagonists of Westland's development would wish, in view of the large areas of cut-over land available. It is necessarily limited by the priorities recommended by the Forestry and National Development Conferences. The area planted in 1970 was 1,187 acres (480 ha), apart from 300 acres (121 ha) of private planting.

One hundred and fifty applications for mining privileges were received this year, and about a third of the conservancy total of State forest land is now affected by privileges or applications. Some of these may possibly prejudice selection logging operations in south Westland.

Interest has been taken by the Department of Lands and Survey in the possibility of grazing cut-over State forest land, and an extensive survey made to assess its potential. Grazing will be encouraged on cut-over areas not yet prepared for planting or on established areas where trees are above browse level.

Moves to set up deer farms and zoological gardens in various parts of the country have created a demand for live noxious animals, and Westland is a principal region for capturing them. Because of the rugged terrain and the use of helicopters, it has been difficult to police the regulations governing the taking, holding, and transferring of wild animals, but control is being tightened to prevent possible abuse.

Canterbury—New planting in State forests totalled 1,653 acres (669 ha), compared with 1,595 acres (645 ha) the previous year; 1,022 acres (414 ha) was restocked, compared with 1,593 acres (645 ha) in 1969–70.

The Canterbury University Students' Association has demonstrated its faith in forestry as a long-term investment by its proposals to develop an exotic production forest on 600 acres (243 ha) of State forest land to be leased near Methven. Planning is well advanced and planting could begin this winter.

With the full support of the North Canterbury Catchment Board, a programme of protection and production forestry was initiated to reduce run-off from Mt. Thomas.

A review has been made of long-term availability of forest produce from State forests in Canterbury. The smallwood component has received special attention because of the large volume involved, tentative proposals for export of chips, and the prospect offered for replacement of some existing stands by faster-growing species.

In expectation of periodic blowdown in Canterbury, an action committee (comprising representatives of sawmillers, growers, and the Forest Service) was formed in January 1969 to handle arrangements for rapid salvage of downed timber. When gales in late August and September 1970 threw some 3 million cu ft (85,000 m^3) at Hanmer, Balmoral, Selwyn Plantation Board, and Eyrewell forests the committee was able to reorganise current operations to recover the timber with a minimum of disruption and delay. Logging of all the affected areas was completed in a little over 6 months, with negligible loss through deterioration.

Three runholders are now engaged in providing trophy hunting for tourists, and others appear likely to take it up. Reports indicate that deer are building up on some runs, doubtless in support of these ventures. Inevitably, there is conflict of interest between runholders, commercial hunters, and deerstalkers, as well as a threat to sound soil conservation practice through increased grazing by deer. An associated problem urgently requiring rationalisation is public access to mountain lands of the Crown. In this connection, a Forest Service - sponsored hunting scheme in north Canterbury, under which hunters cross run country with a forest ranger in departmental vehicles, satisfies both runholders and hunters and goes a long way to solve the local problem.

Hanmer Forest continues to be a popular recreational area. An attractive lookout building has been completed in Conical Hill Reserve and a forest drive and a second forest walk opened.

Southland—New planting totalled 6,278 acres (2,541 ha), compared with 6,604 acres (2,673 ha) the previous year, 3,486 acres (1,411 ha) being in Otago and 2,792 acres (1,130 ha) in Southland. A major contribution (1,816 acres or 735 ha) was made by labour engaged under the winter employment scheme.

Priority for land acquisition still lies within the Balclutha orbit. The need for land to meet Forest Service planting targets in south Otago was eased a little by the acquisition of over 10,000 acres (4,047 ha). Negotiations are continuing for a further 29,000 acres (11,736 ha).

There has been a widening of interest in the use to which land in the Hokonui Hills should be put. The Southland Catchment Board is concerned with the area as the source of rivers that cause flooding downstream, and the Nature Conservation Council wishes to preserve scientifically valuable remnants of native forests. Forest Service acquisition of land now fragmented under various ownerships would enable the area to be managed according to multiple-use principles to meet the wishes of the interested organisations.

Southland had one of the worst-ever fire seasons. A total of 22 outbreaks were recorded, of which 11 causing significant loss occurred on or immediately after the "blow up" of 10 February 1971. (See p. 22.) Losses in exotic forests at Slopedown, Hokonui, Hinahina, and Waikoata totalling over 900 acres (364 ha) were all caused by breakaways from controlled burns, some of which had been lit as long as 4 weeks previously.

PRODUCTION FORESTRY

AFFORESTATION

Planting—The area of new forest planted in State forests was 36,416 acres (14,740 ha), only slightly less than the post-war record figure last year of 36,538 acres (14,787 ha). The figure again was nearly 5,000 acres (2,024 ha) ahead of target, owing once more to the extra availability of labour and money from the winter employment scheme. Although it gives a most welcome addition to new planting, the winter employment scheme presents quite serious planning and budgeting difficulties. Since it is not known until the planting season is well advanced how many men will be offering and in what places, it is quite impossible to avoid upsets to orderly planning and, indeed, to day-to-day administration. Conservancy and forest staff must exercise great ingenuity to ensure that adequate land is prepared and sufficient tree stocks are to hand in nurseries in anticipation of extra labour possibly being available. It would be far preferable in future for the employment of men normally engaged in seasonal work to be a planned addition to the forward planting programme rather than an uncertain part of it.

The private sector again substantially increased its planting, with the major companies in the Bay of Plenty playing a leading role. The estimate of planting for 1970 is 28,400 acres (11,490 ha), making a provisional total for State and private of 64,816 acres (26,230 ha).

Net gain—It is now generally accepted that net gain to the nation's forests is a more meaningful yardstick of progress than new planting. The area clear felled and replanted varies from year to year, and there are losses from fire, windthrow, drought, disease, and particularly in the private sector, delays in replanting or failure to replant at all. Although the area planted in 1970 substantially exceeded the approved minimum target of 57,000 acres (approximately 23,000 ha), the estimated national net gain did not quite reach the complementary figure of 50,000 acres (20,000 ha). In the 2 years since the targets were approved by the National Development Conference the deficit in net gain is of the order of 1,800 acres (730 ha).

Land acquisition—Since 1969 the Forest Service has been more active in acquiring land to develop its forests in accordance with approved planting programmes. More marginal land is being offered, and with the expansion of private planting, particularly in the Bay of Plenty and Nelson, an element of competition is arising. Unless there are compelling reasons for purchase by the State, such as buying adjoining or nearby land to build up an economic forest unit, the policy is to leave the way open for the private investor, and land values are not unnecessarily inflated.

Afforestation around Lake Taupo—"Ecology" as a term has special significance to Lake Taupo and its environs. The lake's scenic backdrops, clear waters, beautiful shores, and fine rainbow trout draw thousands of visitors each year, and a high value is put on its capacity to store water for the eight hydro-electric stations on the Waikato River. All could be severely diminished if the biological attributes of the lake and its catchment are seriously altered.

It is largely for this reason that the Forest Service has been anxious to co-operate in developing a multi-purpose 70,000 acre (28,329 ha) forest on the eastern shores of Lake Taupo. The land, which is highly productive for forestry purposes, is Maori owned and a lease has been signed by the trustees for Lake Taupo Forest and the Minister of Forests. The basis of the lease is sharing of the eventual income between lessee and lessor according to the investment of each party. Already close to 6,000 acres (2,428 ha) has been planted, and a further 4,000 acres (1,619 ha) has been prepared for planting in 1971.

There is great scope for expansion of forests to the south and west of Lake Taupo, where the owners of Maori land would like to see a similar area planted under the profit-sharing leasing scheme. Private afforestation companies are being encouraged to participate. Forests here would put the land to productive use and offer an alternative to pasture, with less harmful effect on the lake waters. As with the east Taupo forest, they would be designed as a scenic and recreational asset as well as for production forestry.

It is particularly desirable that the land draining into Lake Rotoaira should be planted as protection for the Tongariro power development. By doing so it is hoped to minimise enrichment of the lake with nutrients and thereby control the growth of lake weed which has proved damaging in other hydro lakes. Afforestation would provide adequate deep-rooted cover to control run-off and erosion, and production of wood from the forests would have long-term economic advantages to the district.

In the short term, it would help improve the stability and permanency of Turangi as a community if the planting programme could be built up to coincide with the decline in activity of the power development project.

Progress with the forestry encouragement grants scheme—After the first full year's operation of the grants scheme, 329 applications were approved for woodlots and small forests totalling 33,000 acres (13,355 ha), with establishment spread over 10 years. Of this, 2,500 acres (1,012 ha) were planted during the year, and an estimated 8,000 acres (3,238 ha) are scheduled for 1971. The average-sized woodlot is 100 acres (40 ha), nearly double the average size of those planted under the old loan scheme. A feature of the grants scheme is the participation by businessmen and non-farmer landowners who are buying up properties with the object of developing small forests.

Local-body forestry—Following the successful launching of the Marlborough Forestry Corporation, more interest has been shown by local authorities or groups of authorities in afforestation under the loan scheme. At present nine local bodies or groups are investigating the possibility of establishing or expanding their own forests with the object of improving the economy of the district as well as making money for themselves.

SILVICULTURAL OPERATIONS

Species planted—As stated above, the total new planting of exotics in State forests was 36,416 acres (14,737 ha), slightly less than last year. However, the proportion of radiata pine planted increased; this year 31,317 acres (12,674 ha) was planted, compared with 29,024 acres

(11,746 ha) planted in 1969. Douglas fir planting—the second most important exotic species in State forests—fell to 3,545 acres (1,435 ha), a drop of 1,808 acres (732 ha). Ten years ago the areas planted were 4,760 acres (1,926 ha) of radiata pine and 2,120 acres (858 ha) of Douglas fir, out of 9,640 acres (3,900 ha), telling comment on the large increase in State planting and on the shift in emphasis to more productive species.

Restocking—It is now practice to refer in this report only to restocking by planting (see appendix 3), as these restocked areas can then be confidently claimed as being productive. The area restocked this year was 8,899 acres (3,601 ha), 3,381 acres (1,368 ha) more than last year.

Clear felling—For the first time in the history of the Forest Service clear felling in exotic forests exceeded 10,000 acres (4,047 ha), the area felled totalling 10,884 acres (4,405 ha), 1,007 acres (407 ha) more than last year. Over 70 percent of this area was of radiata pine and nearly three-quarters of the volume of radiata pine yielded by State forests was produced by Rotorua Conservancy. The total yield of 106 million cu ft (3.0 million m^3) from clear felling and thinning was also a new record for the department.

Pruning—The total area pruned was 26,330 acres (10,656 ha), 7,185 acres (2,908 ha) less than last year. These statistics give some idea of the total work load of this important silvicultural operation.

A better expression of pruning achievement is the area over which pruning to first log height or to some other level designed to meet certain utilisation needs was completed. The area pruned to 18 ft (5.5 m) was only 7,185 acres (2,908 ha) in the year ended March 1971 compared with 8,548 acres (3,459 ha) in the previous year, a drop of 1,363 acres (552 ha).

Thinning—Thinning to provide an intermediate yield of 19 million cu ft (0.54 million m^3) was carried out over 7,014 acres (2,838 ha)—6,381 acres (2,582 ha) in 1970–71—and another 14,211 acres (5,751 ha) of young stands were thinned without production in order to promote growth on residual trees. The reduction from the previous year, 3,257 acres (1,318 ha), was even more marked.

Indigenous logging—Areas of indigenous State forests logged for podocarp timber are either converted to exotics, developed for farm land, or set aside for other purposes. In south Westland, logging of podocarp forests on river terraces is increasingly being done on a selective system. In 1970–71, 695,000 cu ft (19,700 m^3) of logs was removed from State forests without any clear felling; this yield represents over 13 percent of all timber sold from State forests in Westland.

WORKING PLANS

The Forests Act 1949 requires the preparation of working plans to regulate the management of all State forest land. Each plan must specify the silvicultural operations to be carried out, the maximum amount of produce to be disposed of, and any other aspects as the Director-General sees fit. All working plans operate under the authority of the Minister of Forests.

At present there are 171 State forests containing 8.4 million acres (3.4 million ha) under working plan control. All major forests are covered. The first working plan was prepared for Dusky Forest in 1937, and after 34 years of experience the role and achievements of plans can be seen in perspective. There is no doubt that working plans have induced stability in the managing of State forests and have helped thwart attempts to apply pressure on the Forest Service to adopt practices which would have been against the long-term interests of the forests. Working plans are not inviolate, but changes are not made lightly, especially in the objects of management and the prescriptions dealing with allowable cuts.

As the large areas of exotic forest planted since the Second World War are now reaching maturity and the available supplies of raw material are becoming more important for the development of forest industries, it is proposed to shift the emphasis towards the preparation of regional management plans. These regional plans will carry the authority of the Minister, will define the objects of management, and co-ordinate the management of several forests in a region. Regions are likely to be defined mainly on the basis of logical resource units which will require similarity of management.

POVERTY BAY - EAST CAPE SCHEME

In the 1969–70 annual report it was stated that planting at Mangatu Forest exceeded 2,000 acres (809 ha) for the first time. This forest was started in 1961 with the major aim of stabilising the upper catchment of the Waipaoa River, an area subject to massive earth slumping under pastoral use. In May 1968 the Government announced its intention to adopt the recommendation of the Soil Conservation and Rivers Control Council Technical Committee of Inquiry which studied a wide area of the Poverty Bay - East Cape district beset with similar problems. Last year, the Minister of Works authorised the production of a 5-year plan to give effect to the Government's decision.

The Forest Service, as the agency charged with the afforestation of some 250,000 acres (101,200 ha) of the critical headwaters area, is conscious of its responsibility to reach the planned target of 5,000 acres (2,024 ha) annual planting in this zone by 1974–75. It is confident that experience at Mangatu Forest shows there are no insuperable technical or operational problems in doing this. It is also satisfied that the work at Mangatu Forest has already demonstrated the efficacy of afforestation in stabilising land, as well as the social and material gains to the district from a continuous afforestation project. Provided that sufficient land and money are available, these benefits can be repeated on a larger scale in the areas to the north.

During the year under review, only 1,417 acres (573 ha) was planted at Mangatu Forest and 682 acres (276 ha) at the new Ruatoria Forest, making a district total of 2,099 acres (849 ha); regrettably, this is less than the 2,500 acres (1,012 ha) planned. It cannot be emphasised too strongly that an assurance of continuing funds is essential if Government policy for the east coast is to be implemented.

Another 4,900 acres (1,983 ha) of land was acquired adjacent to Mangatu Forest, thus ensuring a 3-year continuation of employment for the rural population centred on Te Karaka. Further acquisitions, particularly in the Ruatoria district, are urgently needed if planting targets are to be achieved.

FIRE CONTROL

Fire hazard—For the second year running the fire risk was extremely high. Summers were abnormally hot and dry in the southern parts of the North Island and throughout the South Island. Fire hazard readings were the highest ever recorded in north Canterbury, but fortunately that most dangerous wind—the nor'wester—was virtually absent. In Otago and Southland, however, low humidities and high temperatures, combined with gale force north-westerly winds to give a "blow-up" situation in February 1971. On 1 day alone seven separate fires broke out in recent exotic plantings, most of them originating in peat which had been ignited some weeks earlier during controlled burns to clear land for planting and farming. On that day 1,043 acres (422 ha) of young State and private plantations were destroyed in eastern Southland, the largest fire losses which have been suffered for many years.

The total area of young forest burnt throughout New Zealand was 1,258 acres (509 ha), of which 966 acres (391 ha) was State forest. In addition, more than 5,000 acres (2,024 ha) of native forest, mostly logged, was destroyed. The most distressing loss of standing forest was 400 acres (162 ha) of beech forest at Greenstone near Lake Wakitipu.

Regional fire emergencies—The severe situation in Otago and Southland was short-lived and it was not necessary to declare a regional emergency, owing to prompt and co-ordinated action by the Fire Services Council and the Forest Service. However, a regional fire emergency was declared in the Hutt Rural Fire District to deal with a prolonged and serious outbreak in the Wellington City and Suburban Water Supply Board's catchment.

Volunteer rural fire fighting—A welcome and most praiseworthy development has been the number of volunteer fire fighters comprising members of bush fire forces and conservation societies now active in the Wellington region. These people have become exasperated at the continual gorse and scrub fires in the local hills and the steady erosion of the remaining pockets of native bush and regenerating forest, and they are determined to do something about it.

Appeals to this service for equipment and training met a ready response and an ad hoc body, the Wellington Hills Fire Prevention Committee, chaired by the Forest Service, was formed. The aim of this committee is to co-ordinate the activities of local bodies, fire brigades, the volunteers, and the Forest Service in the prevention and control of fires on the hills surrounding Wellington.

The fire brigades and volunteers combined to suppress all the hillside fires that occurred this summer before they got out of hand.

Fire as a tool of management—With the larger acreages of new planting and more areas being logged and replanted, the controlled burn programme reached 45,000 acres (18,212 ha) this year in State forest or land leased by the Forest Service. Of this, 11,000 acres (4,452 ha) was in logged native forest and 8,000 acres (3,238 ha) in logged exotic forest. In the private sector at least 25,000 acres (10,118 ha) of land was prepared for planting by burning.

PRODUCTION, CONSUMPTION, AND TRADE

TOTAL WOOD PRODUCTION

Total production from indigenous and exotic forests reached 289 million cu ft (8,178,700 m^3) of roundwood in the year ended 31 March 1971. This was an increase of 13 million cu ft (368,000 m^3) over the previous year. The quantity of logs for chipping was more than double that for the previous year. There was a small increase in volume of logs for sawing. The volume of roundwood pulped was similar to that for last year, additional pulp production coming from use of sawmill residues and waste paper. Exports of logs reached a new record level, being slightly above last year's.

Indigenous forests contributed 35.8 million cu ft (1,013,000 m^3) of total wood production, and although a high percentage of this is still used as saw logs there is a trend toward utilising indigenous wood for export as chips (beech species) or for domestic pulping (tawa). The percentage of indigenous wood in total production dropped from 13.2 percent in 1970 to 12.4 percent this year.

The pulp industry used 48 million cu ft (1,358,000 m^3) of roundwood, 26 million cu ft (735,800 m^3) of sawmill residues, and 5 million cu ft (142,000 m^3) roundwood equivalent of waste paper. There are still considerable quantities of forest and mill residues available for use by the pulp industry.

The chip mill producing for export in Nelson used 7 million cu ft (198,000 m^3) of roundwood during the year, thus doubling the input in its second year.

The contribution from State forests to total wood production was 43.3 percent, 2.8 percent more than last year. For indigenous timber there was an increase in the share of State forests from 44.7 percent to 53.1 percent. For exotic timber the contribution of State forests rose from 39.9 percent to 41.4 percent.

SAWN TIMBER PRODUCTION

Production of sawn timber in the year to 31 March 1971 reached a record level of 784 million bd ft. This total was 2.5 percent higher than that for the previous year.

The trend for production of exotic timber to increase and for production of indigenous timber to decline is becoming more marked. Exotic timber production, at 596 million bd ft, was 29 million bd ft, or 5 percent higher than in the previous year, whereas indigenous timber production fell by nearly 10 million bd ft, or 4.8 percent, to 188 million bd ft.

Forests in Rotorua Conservancy provided over 33 million bd ft more than in the previous year; the total from all other areas was slightly below that for 1970.

Production from exotic pines rose by nearly 32 million bd ft, overshadowing a slight fall in production from Douglas fir due to a temporary downturn in markets in Australia.

The lower output of indigenous timber was due mainly to declining production of matai and tawa in the North Island. South Island production remained at last year's level.

During the calendar year 1970, exports of exotic timber totalled 113 million bd ft, an increase of 6 million bd ft over the total for the previous year. Domestic consumption of sawn timber for the year ended 31 March 1971 fell to 240 bd ft per head, compared with 243 bd ft in 1970. It is a remarkable fact that despite the inroads of substitutes the per head consumption of sawn timber is the same as it was at the turn of the century, and it is currently higher than in any year between 1910 and 1948.

FOREST SERVICE PRODUCTION AND SALES

Production—Removals of roundwood from State indigenous and exotic forests totalled 125.2 million cu ft (3,543,000 m^3) during the year ended March 1971. This represented an increase of 13.4 million cu ft (379,000 m^3) over the total for the previous year.

Indigenous roundwood removals rose again this year by 2.7 million cu ft (76,000 m^3) to 19.0 million cu ft (538,000 m^3). All conservancies apart from Southland, where there was a slight fall, had higher indigenous removals. Rotorua Conservancy showed the greatest increase, removals totalling 5.8 million cu ft (164,000 m^3), an increase of 1.5 million cu ft (42,000 m^3). This total is slightly less than that of the largest producer, Westland Conservancy, total removals from which were 5.9 million cu ft (167,000 m^3). As the resources for production of indigenous sawn timber continue to decline, the Forest Service is becoming an increasingly important supplier of logs; its share of overall supply has risen from one-third to over a half in the last 10 years.

Removals from exotic forests rose by 10.7 million cu ft (303,000 m^3) to 106.2 million cu ft (3,005,000 m^3). Of this total, log exports accounted for 19.9 million cu ft (563,000 m^3). All conservancies had higher removals, the greatest being 6.8 million cu ft (192,000 m^3) in Rotorua. This conservancy produced 72 million cu ft (2,038,000 m^3) of exotic roundwood, of which 68.7 million cu ft (1,944,000 m^3) came from Kaingaroa. This forest alone produced 65 percent of all the wood harvested from State exotic forests and supplied over 40 million cu ft (1,132,000 m^3) to one purchaser.

Sales—The value of timber sold and removed from State forests during the year ended March 1971 totalled $13.1 million, compared with $11.6 million in the previous year.

Sales of standing timber from State indigenous forests totalled 15.5 million cu ft (439,000 m^3) and were valued at $1.3 million; the total for exotic forests was 53.9 million cu ft (1,525,000 m^3) valued at $2.3 million. These figures give an average stumpage of 8.5c per cu ft ($3 per m^3) for indigenous timber and 4.3c per cu ft ($1.52 per m^3) for exotic timber. The figures for the previous year were 9.5c per cu ft ($3.35 per m^3) and 4.2c per cu ft ($1.48 per m^3) respectively.

Sales of logs totalled 55.8 million cu ft (1,579,000 m^3), valued at $9.5 million. Indigenous forests contributed 3.5 million cu ft (99,000 m^3) and $1.0 million to these totals, while exotic forests contributed 52.3 million cu ft (1,480,000 m^3) and $8.5 million.

PULP AND PAPER

Pulp production after rising sharply the previous year tended to level off during the year ended 31 March 1971, but still rose by 14,000 tons (14,224 metric tons) to 567,000 tons (576,072 metric tons). Substantial

growth in output can be expected to resume in 1972, when additional plant begins operating. Higher output in 1971 was due entirely to increased production of mechanical pulp.

Because of limited expansion in pulp production and increased exports, the manufacture of paper could not be expanded greatly; 16,000 tons (16,256 metric tons) more than in 1970 was made, bringing the total output of paper to 455,000 tons (462,280 metric tons). The additional amount consisted of 6,000 tons (6,096 metric tons) of newsprint and 10,000 tons (10,160 metric tons) of industrial papers.

Domestic consumption of paper rose substantially, added demand being met partly by increased domestic production and partly by higher imports.

PANEL PRODUCTS

Rapid growth in recent years has greatly increased the relative importance among the wood-based industries of the panel products sector. During the year ended 31 March 1971 the following production estimates were supplied to the Forest Service:

	Particle Board ($\frac{3}{4}$ in. basis)	Plywood ($\frac{3}{16}$ in. basis)	Fibreboard
	million sq ft	*million sq ft*	*tons*
Total	29.6	58.1	43,623
Increase over previous year ..	8.1	3.4	4,070

	metric tons	*thousand cubic metres*	*metric tons*
Total	34,818	25.7	44,321
Increase over previous year ..	9,260	1.5	4,135

Present indications are for continuing rapid expansion of manufacture, especially of particle board, production of which rose by 38 percent in the year ended 31 March 1971.

COMMERCIAL DIVISION OPERATIONS

Re-equipment of mills—Waipa sawmill began operations in 1939. Apart from the addition of a band mill and treatment plants, most of the original equipment is still in operation and is now beyond efficient and safe working limits. It is therefore essential for certain sections to be modernised and re-equipped to maintain efficiency and profitability. Good progress has been made with the provision of a new planing mill. Work is also under way to determine the most suitable replacement equipment for the frame mill.

A board chipper edger, the first of its kind in New Zealand, was installed in October. Its advantage over conventional saw edgers is that it edges the boards and converts the edgings to chips in one operation, with no sawdust. The surface finish was initially a problem, its quality being reduced by the tear-out of wood fibre associated with distorted grain around knots. Knives with a modified design, resulting from trials on New Zealand material, have now been installed. The edger is in commercial operation and available for inspection.

The remanufacturing and lamination sections also need improved facilities; these, coupled with the new planing mill, will provide better timber utilisation together with diversified and more complete servicing of the timber market.

Approval was given during the year for the installation of a pressure-treatment plant at Conical Hill sawmill. It should be operational by mid-1971 and, in addition to providing essential treatment facilities for sawn timber, will be producing a variety of treated round fencing material and poles.

Preservative evaluation—A preservative treatment developed by CSIRO, Australia, to protect hardwood timbers from termite attack has been applied satisfactorily to New Zealand timbers in tests at Waipa sawmill. The treatment is similar to the commonly used boron-diffusion process and, in fact, the preservative contains boron salts but with the addition of chromium, arsenic, and fluoride salts. Although the treatment is unlikely to be needed for timber used here, it is expected to be acceptable in overseas countries where timber is exposed to termite attack.

Waipa sawmill—While the production of 45 million bd ft of sawn timber for 1970 was the same as in 1969, sales during the year rose by over 11 percent. The operating profit for the year was $315,088. After providing for taxation and for interest on the assessed borrowed portion of capital, the net profit allows a return of 7.8 percent on shareholders' funds under the existing notional capitalisation authorised by Treasury.

Conical Hill sawmill—Production of sawn timber showed an increase on last year's total, rising from 8.8 million bd ft to 10.3 million bd ft—an increase of approximately 17 percent. This was closely matched by a sales figure of 10.1 million bd ft, representing a rise of 16 percent over the 1969 figure of 8.7 million bd ft. The operating profit for the year of $85,000 was 97.5 percent higher than the 1969 figure of $43,053. The net profit after taxation and interest under the notional capitalisation scheme represents a return of 8 percent on shareholders' funds. This is nearly double last year's figure of 4.1 percent.

Stumpages—Waipa paid the same stumpage as in 1969, i.e., 5.0c per cu ft ($1.77 per m^3) for a product mix of radiata pine, Douglas fir, and small-diameter larch and Corsican pine. Conical Hill also paid the same price as for last year, 15.7c per cu ft ($5.54 per m^3) for logs delivered to the mill skids.

Marketing—Export marketing remains an important part of Commercial Division activities and although based primarily on Waipa sawmill, which exported 21 million bd ft, or 48 percent of total sales, there were increasing exports from Conical Hill sawmill to Japan and Australia. Conical Hill also played an important role in co-ordinating the export of beech sawn timber to Japan on behalf of a number of private sawmillers.

Laminated Douglas fir scaffold planks are now in regular use in New Zealand, and the Commercial Division is active in promoting acceptance of this product in Australia. A member of Commercial Division staff attended tariff hearings in Australia to submit evidence seeking a remission of duty on such planks.

The Pacific Islands remain a good market for New Zealand timber, although real problems exist in obtaining regular shipping. During the year Commercial Division has given technical advice to the Cook Islands regarding the use of New Zealand timbers in building construction.

EXTERNAL TRADE

Exports—Exports of forest products in 1970 reached a record value of $71.2 million, which surpassed the previous record, set in 1969, by $10.3 million. This was attributable to increases in export of logs, sawn timber, pulp, and panel products. Of the major product groups, only paper experienced a slight fall-off in volumes exported.

Australia and Japan continue to be New Zealand's main customers for forest products exports. Australia bought 43.9 percent of forest exports by value and Japan 39.7 percent. The growth in exports to the Pacific Islands has continued, with the value in 1970 nearly double that of 1969.

Log exports—The record level of log exports in 1969 was surpassed in 1970 when 64.3 million cu ft (1,820,000 m^3) was exported. The value of this was $24.8 million, an increase of $2.2 million over 1969. Mt. Maunganui was the major port in this trade, handling in excess of 80 percent of the logs exported.

Wood chip exports—In the second year of export the Nelson wood chip industry has continued to operate successfully. Revenue earned for New Zealand from this source in 1970 amounted to $1.8 million.

Sawn timber exports—Sawn timber exports rose to 113 million bd ft in 1970. This represented an increase of 6.6 percent on the previous year. Exports of radiata pine to Japan fell from 39.3 million bd ft to 30.9 million bd ft, while the export of the same species to Australia remained at slightly more than 30 million bd ft. Exports of Douglas fir to Australia fell from 19.3 million bd ft to 16.6 million bd ft in 1970. However, increases in Douglas fir exports to the Pacific Islands offset this decline. Exports of radiata pine to this area also increased. The promise of increased sawn timber sales in the United Kingdom was fulfilled in 1970 with the exportation of 6.7 million bd ft.

Pulp and paper exports—In 1970 the value of pulp, paper, and paperboard exports was $28.9 million, an increase of $2.8 million on the 1969 value. While paper exports, both newsprint and other paper, showed little change on the previous year, pulp exports recovered from the low 1969 figure to reach 96,000 tons (98,000 metric tons) in 1970. Pulp exports can be expected to be maintained at a high level in the next 2 years to safeguard adequate markets and to anticipate further expansion in pulp production for export. The high level of pulp exports was responsible for the increase in export value experienced in the pulp and paper section in 1970.

Other products—The increasing contribution of panel products to the export scene was maintained in 1970. Value of panel products exports increased from $1.1 million in 1969 to $1.5 million in 1970, a growth of 36 percent.

There was also a sharp increase in exports of manufactured wood products in 1970. Value of exports reached $4.5 million, more than double the 1969 value.

Imports—Imports of forest products worth $22.7 million entered New Zealand during 1970, a rise of 30 percent over the 1969 figure.

Sawn timber imports increased in 1970 from 19.3 million bd ft to 20.9 million bd ft, a rise of slightly more than 8 percent. Imports of hardwoods were responsible for this increase, as the volume of softwoods imported

declined in 1970. The value of the increased volume of imports rose to $4.1 million, which was an increase of 20.6 percent over the previous year.

Imports of paper and paperboard increased sharply in 1970, when 28,201 tons (28,652 metric tons) was imported. This was a large increase on the 1969 volume, which was the lowest since 1965. Value of paper and paperboard imported during 1970 amounted to $10.2 million, $1.1 million greater than in 1969.

Imports of woodpulp increased sharply in 1970, compared with the low levels of 1968 and 1969. A total of 18,562 tons (18,859 metric tons) was imported, compared with 10,902 tons (11,076 metric tons) in 1969. This represented a 70 percent increase for the year. The value of pulp imports rose even more spectacularly than the volume. The 1970 value of $3.3 million was 175 percent above the 1969 value of $1.12 million.

The pattern of imports by countries showed a major change from past years, with Britain being superseded by the United States as the chief supplier. The United States provided 26.4 percent of forest products imports and Britain 22.7 percent. Australia maintained its third placing by supplying 16.5 percent of total imports of forest products.

NEW ZEALAND - AUSTRALIA FREE TRADE AGREEMENT

Development—During the year the NAFTA Joint Consultative Council on Forest Industries published a *Report on Australia - New Zealand Forest Resources, Consumption, Production, Imports, and Exports*. This is aimed at promoting mutually beneficial expansion of trade in forest products between the two countries and achieving the most effective use of their combined forest resources. The detailed forecasts supplied by both countries for future levels of production and demand have gone a long way towards achieving these goals.

After a meeting between Australian and New Zealand sawmilling representatives in September, it was agreed to set up a joint panel on sawmilling products. This move reflects the awareness that long-term prosperity of the sawmilling industries of both countries can be improved by close co-operation. The intention is for the panel to meet periodically to study supply, demand, and price situation. The inaugural meeting was scheduled for April 1971, in Wellington.

RESEARCH AND DEVELOPMENT

RESEARCH

The *Report of the Forest Research Institute for 1 January to 31 December 1970*, published separately, deals fully with this year's research work. Selected aspects only are recorded here.

New research building—Stage II of the new Forest Research Institute is nearing completion. Plans to house the Protection Forestry Branch on the University of Canterbury campus at Ilam and to continue the rebuilding of the Rotorua part of the institute with stage III have been delayed by financial stringency. Both delays are unfortunate, the former particularly so.

Progress has been made in equipping research laboratories in the Forest Products Branch housed in stage I; at present, the main deficiency is in the adhesives and composite wood laboratory, which will be a new research field at Rotorua.

Journal of forestry science—In accordance with a recommendation of the Forestry Development Conference, a *New Zealand Journal of Forestry Science* has been initiated. An editor has been appointed, and the first number will be issued shortly.

Dothistroma needle-cast fungus—An extensive series of spraying trials against the needle-cast fungus *Dothistroma pini* has produced results of great value to forest management. Whereas in the early years of the disease, 1966–67, it was estimated that a spray régime of two applications a year for 10 years might possibly be necessary, there is now evidence to suggest that, at least in the central North Island, radiata pine may need to be sprayed only three or four times in a rotation, with a dosage rate of 4 lb of cuprous oxide in 5 gal of water per acre (4.5 kg in 60.9 l of water per ha), applied in November or December. Assuming four sprayings, the compounded cost in growing trees on a short (26-year) rotation saw-log régime is equivalent to about 9c per 100 bd ft sawn output, or little more than 1 percent of the present average wholesale price. Similarly, four sprayings on trees grown on a 22-year pulpwood rotation would mean an extra cost of about 60c per ton (61c per metric ton) of newsprint—about 0.4 percent of the Auckland average f.o.b. price.

Branching habits—For many years it was thought that the most desirable radiata pine had what is known as a multinodal habit, involving branches growing out at various levels of the year's growth, as opposed to a uninodal habit of a single whorl of larger branches per year, but recent calculations based on the grade out-turn of timber from the two types of trees have shown that the uninodal habit, in giving a larger proportion of clear wood, can produce the higher value logs under some management systems. Accordingly, uninodal trees have been included in the tree breeding programme, and arrangements are being made to establish a seed orchard of this type of tree.

Leader dieback in pines—An undesirable feature of many New Zealand exotic forests is the high proportion of malformed and crooked trees, often caused by leader dieback. Of late years the phenomenon has been especially noticeable in new forests established on volcanic

soils to the east of Mt. Tarawera. The dieback is caused by pathological fungi, but the respective roles of malnutrition, climatic effects, and genetical make-up in predisposing trees to attack have not been defined.

Although abnormal nutrition does not appear to be critical, research to date shows that trees making rapid growth under adequate levels of nitrogen nutrition are much more susceptible than those whose growth is restricted by nitrogen deficiency. The problem is an important one, involving research from several different lines of approach.

Undiagnosed tree mortality—Over the last 10 to 15 years there has been considerable mortality of several species of native trees in some localities, particularly in mountainous country. This has been of concern to the Forest Service, particularly since the causes have been so hard to identify.

Totara has become unthrifty over a wide area of the North Island and is perhaps seen at its worst in Whirinaki Forest in Rotorua Conservancy. Many of the larger trees there have died, and the areas with the highest concentration of deaths have been logged. Some exploratory work has been done to try to define the cause; opossums have sometimes been blamed, but the evidence is not conclusive.

Decline of tawa has been studied in the Ureweras, where death of exposed leaves and shoots has been found to coincide with the onset of early winter frosts. Damage has been more severe in logged areas than in virgin stands, where the tawa is protected by a canopy of podocarps.

Widespread death of kamahi in many North Island forests has greatly reduced the abundance of this tree. Opossums have again been blamed, but the evidence is contradictory or, at best, inconclusive.

Recent research has shown for the first time that attack by native *Platypus* beetles can kill beech trees, and this may account for at least some of the previously unexplained mortality among these species. As happens with other bark beetles overseas, *Platypus* populations build up in forest wastes and then move on to attack living trees. Death of the trees is thought to be caused by a fungus introduced by the beetles, but final proof of this is lacking as yet.

Nursery experiments—A series of nursery experiments has confirmed the importance of frequent wrenching to produce sturdy plants to give a high rate of survival after planting out. Trials of storage methods after lifting in the nursery have shown that mortality increases significantly after 4 months' storage. On frost flats it has been demonstrated that quality of nursery stock as well as the standard of site preparation is of critical importance for survival and initial growth. Operational results of summer and autumn planting have not fulfilled the promise of earlier small-scale trials.

At Rangiora, experiments continued in raising on a user scale the nitrogen-fixing green alder (*Alnus viridis*), which because of its capacity to grow on very poor soils and screes has been found to be quite outstanding for high-altitude revegetation work. Cool storage after lifting, with subsequent planting out when soils had become warm and moist in spring and summer, was found to be a promising technique for the rapid establishment of alder, and of another useful protection forest species *Pinus mugo*.

Watershed surveys—In some high-country catchments noxious animal control operations have resulted in a substantial reduction of animal numbers, and as a consequence in some areas there has been

noticeable recovery of the vegetation. In others, animal populations are still too high. For all areas the present requirement is an evaluation of the degree of control in relation to the condition of the vegetative cover. This is particularly necessary in those vegetation zones which formerly held high animal concentrations and where the trend is often difficult to gauge.

Research staff of the Protection Forestry Branch of the institute have continued their surveys of key catchment areas. During the year a special survey of the Haast–Arawhata region was undertaken to assess the effectiveness of animal control by commercial firms using helicopters for venison recovery. This will be followed over the next 5-year period by resurveys of the Waimakiriri, Hokitika, and Wairau catchments and the Tararua Range. Completion of these surveys will strengthen the evidence on which the Forest Service bases its noxious animals control and revegetation programmes.

Fiordland survey—Of more than usual importance were the reports on the 1970 survey in the Fiordland National Park. The Forest Service was asked to report on the wapiti in this area, their relations with the red deer in the surrounding zones, and the effects of both animals on the vegetation.

This investigation was prompted by the expiry of the noxious animals control plan which the Select Committee on Noxious Animals in 1965 suggested be adopted for 5 years. Implementation of this plan has been under the direction of a Fiordland National Park Board subcommittee, on which the Forest Service and the New Zealand Deerstalkers Association were represented. It is now necessary to evaluate the effectiveness of the plan.

During the survey, 1,053 plots were established in the forest and scrubland, the composition and condition of the alpine grasslands were recorded at 1,600 points, the animal distribution and density were determined by recording the faecal pellets present on 11,000 sample points located along the lines of the forest, scrubland, and grassland plots. The co-ordinated results show the areas where animal pressure was most damaging, or vice versa.

There were indications of a relaxation of pressure on the forests and scrublands of the Murchison Mountains, suggesting that animal control there had been successful, but in other areas browsing appeared to be on the increase. Alpine grasslands appeared to be deteriorating where there was little grassland in proportion to forest (as in the west), but were in better condition where there was a higher proportion of grassland to forest.

It is appropriate to report that there were quite wide variations in the density of noxious animals; there were 10 times as many per unit area on the Charles Sound and Caswell Sound watershed as there were in the Transit Sound and Bligh Sound area. The general conclusion was that over the greater part of the area there were more animals than should ordinarily be tolerated in such mountainland environments. In some areas the animals were in poor condition. It was suggested that there were now adequate means of maintaining controlled population levels should it be policy to do so. In fact, after an initial herd reduction which was thought to be desirable, there should still be a population adequate to produce about 1,500 kills a year—far more than is taken by sport hunters at present.

It was also suggested that in some areas of low population the recently devised methods of hunting from the air as well as from the ground, together with new toxicological techniques, could make possible a near approach to extermination, albeit at a very high cost. The report carefully did not recommend land management objectives or policies for the wapiti area, recognising that this is the concern of other authorities, particularly the Fiordland Park Board and the National Parks Authority.

The implications of the report are far reaching and will doubtless be the subject of much debate by the many organisations who are vitally concerned.

WOOD USE

Timber Design Data Handbook—Two more sections of the *Timber Design Data Handbook* were produced during the year. This handbook produces data relating to performance of timber under various designs and with different moisture contents and should be of major assistance to engineers, architects, and other timber users.

High-yield pulping—It is a constant aim in pulpmaking to achieve a higher percentage of acceptable pulp from a given quantity of wood. Even an increase of a few percent could mean substantial savings in costs whilst at the same time conserving raw material resources. For these reasons the Forest Research Institute is paying considerable attention in its research effort to high-yield processes, notably sodium bisulphite and refiner groundwood.

Commercial application of machine stress grading—There is currently world-wide interest in evaluating the strength properties of wood by non-destructive mechanical means rather than by visual grading, as the former method is much more efficient and enables wood to be used less wastefully in engineering applications. This in turn helps wood to compete more effectively with other structural materials, such as concrete and steel, by allowing smaller sized members of higher strength but lower cost to be used in design work.

To keep abreast of world trends, the Forest Service is at present evaluating the technical and economic aspects of grading radiata pine and Douglas fir timbers with a stress grading machine. If results are favourable, it is possible that a machine will be put into commercial production at Waipa sawmill to produce machine stress rated timber for the home and export markets.

Prior to commercial production, however, a standard for machine stress grading will have to be prepared, covering such aspects as the stress grades to be produced, branding, independent verification of machines, and quality control procedures. Also, provision for the use of machine graded timber will have to be made in other New Zealand standards documents.

Quality of Douglas fir sawn timber—Because Australia is the main market for New Zealand grown Douglas fir sawn timber and framing constitutes its major use, the publication in Australia of new visual grading rules for Douglas fir framing and structural timbers, with specific strength figures assigned to the various grades, is of no little interest and significance. A co-operative programme of research by the Forest Service and industry has been initiated to produce data for production and management

procedures appropriate to the needs of the export markets and the home market. The programme involves examination of saw-log and sawn-timber quality from seven different areas in Kaingaroa Forest, which supplies most of the country's Douglas fir. It is hoped to have the programme completed by the end of 1971.

Seasoning of radiata pine round produce—In the last 5 years trials on the seasoning of radiata pine posts have been completed in Auckland, Canterbury, and Westland. They have shown that the procedures for seasoning posts to the standard required by the Timber Preservation Authority (TPA) vary according to geographic locality and according to time of year when the posts are put into stack. Drying rates also vary considerably.

The results of the trials will be published and should act as a guide to post extraction and seasoning operators throughout the country; they should help to eliminate the frequently poor standards in the seasoning of round produce that have long been a source of concern to the TPA.

End-use survey of sawn timber—An end-use pilot survey of sawn timber was undertaken in North Canterbury to establish the volume of usage, by quality classes, in commercial, institutional, and residential buildings in the region. The results indicated that the building industry uses only 52 percent of the sawn timber available on the North Canterbury market; of the proportion used in building approximately 80 percent is used in framing and form work; and the remainder for finishing purposes.

A national survey of end use will begin shortly. Quantities and qualities of sawn timber used in all building categories will be assessed, as will non-building uses. The usage of panel and other wood-based products in the building industry will also be covered. It is a strange fact that in 1971 neither the industry nor the Forest Service knows what happens to all the timber which is sawn.

Reports on timber use—Since June, 3-monthly market reports have been published on a trial basis to give a general picture of current conditions in the timber and wood-based products industries. Information on round produce, sawn timber, veneer, plywood, and other wood-based products is obtained through personal interviews. A regional and national picture of supply, demand, and availability of the various products is also obtained and reported on, as are changes in production techniques and end use. Information for the reports is compiled by convervancy and head office timber officers and by the statistics section of the Economics Division.

Timber inspection—The longhorn beetle (*Arhopalus ferus*) again proved troublesome over the summer months, when large flights of adult insects settled on prepared stacks of timber awaiting export, hiding between boards. Fortunately a cold spell disposed of the insects and large-scale fumigation such as was needed last year was avoided. Because of the flights it was necessary to stop movement of timber from the Taupo area to Mt. Maunganui for approximately 1 week. At Whangarei and Napier, larval stages have been found in export logs, and fumigation was needed before logs could be shipped. The insect must be regarded as established throughout the whole of the North Island, and the Forest Research Institute is investigating control measures, including biological control. Progress has been made in developing insecticidal dips to prevent insect infestation of export packets, and a 0.25 percent lindane dip has proved to be effective against a number of insects.

Metrication and timber standards—The Director of the Utilisation Development Division, along with the Director of the Standards Association of New Zealand, attended the eighth session of the International Standards Organisation (ISO) in Ankara, Turkey, in September. At the meeting, the ISO's Technical Committee 55 (Sawn Timber), of which New Zealand is a participating member, discussed and substantially finalised standards for testing the mechanical and physical properties of wood and for defining metric dimensions of coniferous sawn timber.

In view of the impending changeover from Imperial to metric measure, the timber industry in New Zealand, in its deliberations on metric dimensions for its products, can be expected to take due account of the ISO basic range of widths, thicknesses, and lengths of sawn timber. For New Zealand to adopt a different basis for deriving metric sizes and a different set of sizes would be to negate the objects and the attendant advantages of international standardisation. Alternatively, it would suggest that New Zealand will have at least two different standards—one for the home market and one or more for the export markets—which could prove uneconomic and confusing.

Plant health (quarantine)—While overseas, the Director of the Utilisation Development Division surveyed forest products quarantine procedures in Japan, the United Kingdom, and the United States. In Japan, surveillance of imported logs is thorough, and it is noteworthy that New Zealand timber has the lowest incidence of forest and wood pests of all imported supplies; sawn timber deemed free of bark is not subject to any systematic inspection. The United Kingdom similarly has no organised inspection system for sawn timber and relies instead on contract specifications between buyer and seller for timber free of woodworm. Discussions with the U.S. Federal Plant Health Authority revealed that it has no legislative powers to implement the requirements of the International Plant Convention—the most it can do is appraise exporters and shipping companies of New Zealand's quarantine requirements, and it is willing to do so. However, lack of authoritative supervision of shipments of dunnage and wood packing, for example, implies a need for increased vigilance over cargoes from the United States and particularly from the high forest-insect risk area of eastern states.

EQUIPMENT

Forest radio communications—During a visit to the United States and Canada this year the chief communications engineer found that radio communications contribute much more to forest management efficiency than in New Zealand. The knowledge and contacts obtained from his tour will assist in the planning of forest communications.

Because of the necessity to improve forest communications in the intensively managed Kaingaroa and Golden Downs forests, priority is being given to the installation of very high frequency mobile radiotelephone systems. These will replace the existing outmoded high frequency systems (as has already been done in North America) and will provide prompt and reliable communications within the forests and to headquarters. Five elevated repeater stations overlooking the areas will

give mobile radiotelephone service for the Kaingaroa and Lake Taupo forests. Two similar repeaters will cover Golden Downs. It is planned to have the Kaingaroa system operating for the forthcoming fire season, and Golden Downs will follow shortly after.

Device to alert manpower—A trial with an alerting device on the mobile radiotelephone system in Kaingaroa Forest to summon forest gangs quickly for fire fighting proved successful and was installed in a number of vehicles during the fire season just ended. A signal sent through the mobile radio communication channel is made to trigger a horn or siren on any selected vehicle. Previously during high fire hazard periods it has been necessary to restrict the deployment of forest labour so that they could be readily contacted in the event of a fire emergency. The selective calling system allows these men to be located in the forest to better advantage for both production and fire protection purposes and thus adds considerably to the efficient use of the labour force. The system will be successively installed in Golden Downs and other forests throughout the country.

Radio signalling in logging—In the report for the year ended 31 March 1969 it was stated that a 20 percent increase in productivity was achieved in a pilot trial using very high frequency radio signalling to control log hauling in forests and that trials were being made to determine the most suitable equipment of this type for use with all departmental log haulers. These trials have been completed and radio signalling equipment is in full and successful use on all Forest Service log haulers. Considerable interest has been shown by private logging operators, to whom engineering advice and demonstrations have been given.

ENVIRONMENTAL FORESTRY

NEW ENVIRONMENTAL SECTION

A significant change in the organisation of the Forest Management Division of Head Office reflects the growing preoccupation of the Forest Service with protection forestry, soil and water conservation, recreation, scenery preservation, and other matters affecting the environment. The Forest Management Division has now been divided into a production forestry section and an environmental section, each with an assistant director in charge. While it is essential that all staff must be fully aware of environmental issues, the identification of an environmental section to administer forest recreation, soil and water, as well as fauna and flora conservation, mountain lands revegetation, and noxious animals control, will give due emphasis to these matters. Management of commercial forests and related activities will continue to be the responsibility of the production forestry section.

STATE FOREST PARKS

Staffing and development of forest parks—Five State forest parks, Craigieburn, Tararua, Kaimanawa, North-west Nelson, and Coromandel, have now been gazetted, and advisory committees have been appointed. Lake Sumner Forest Park, which has been operating under a working plan since August 1969, also has an active advisory committee, and procedures for gazettal are under way.

Progress is being made with the establishment of the further forest parks mentioned in last year's annual report, Pirongia, Rimutaka, Ruahine, and Kaweka. Other areas are still under consideration.

Except for Craigieburn Forest Park, which is permanently staffed by Forest and Range Experiment Station personnel, forest park rangers have now been appointed to all forest parks, and this has influenced greatly the development of facilities for park users. As a result, a better understanding is developing of the type of facility required. Greater emphasis is being placed on peripheral developments such as parking areas, shelters, picnic sites, prepared fireplaces, rubbish disposal, toilets, and entrance signs and information signs. The most popular walking routes are being maintained, marked with painted discs, and (as resources permit) improved by the addition of walking bridges and attractive huts at key points.

Present indications are, however, that most forest park users do not favour new development works in natural areas in the interior of parks. The Forest Service policy therefore will be to provide adequate access to forest parks and to improve the facilities at peripheral points. New areas will only be developed where there is potentially high usage of some outstanding recreational feature of a park.

Zoning of forest parks—The Forest Service has examined the zoning system of national parks and forest reserves in a number of countries, and proposals for forest parks in this country have been made. The proposed zoning system, which is being applied initially on a trial basis in Coromandel Forest Park, has seven categories:

1. *Forest sanctuary*—An area set aside for preserving in their natural state the indigenous flora and fauna for scientific and like purposes. Its

near equivalent in New Zealand national parks is the "scientific area" classification. Human interference would be controlled by permit for entry.

2. *Wilderness*—An area whose character is determined by purely natural processes, which is large enough and so situated as to be unaffected except in minor ways by what takes place around it. Access to and within would be by foot only. This is the exact equivalent of "wilderness area" in New Zealand national parks.

3. *Natural environment*—An area which is to be maintained predominantly in its natural state, but where tracks, bridges, and huts may be provided for public enjoyment and safety. Logging, roading, and exotic afforestation would not generally be permitted. The equivalent is the New Zealand national parks' "natural environment area".

4. *Development area*—An area in which facilities for park users may be developed with the minimum of interference with the natural environment.

5. *Historical and cultural area*—The purpose of this zone is to define areas of special interest, and it would include:

(a) Arboreta and outstanding trees.
(b) Military and other historic sites.
(c) Old buildings or structures such as log dams.
(d) Caves and other geological features and thermal areas.

6. *Restricted area*—An area where access is by permit only, for reasons of public safety or protection of facilities and developments, usually lying in the natural environment zone. To include areas used for:

(a) Water supply in the immediate vicinity of reservoirs and intakes.
(b) Research in forest management.
(c) Military purposes.
(d) Mining.

7. *Management area*—An area for the production of timber, indigenous or exotic, or for erosion control plantings or for pastoral use.

RECREATION IN FORESTS

State forest parks are not the only areas of State forest land which provide recreational facilities for the public. Most indigenous State forests, whether they have been accorded forest park status or not, have some degree of recreational use, though generally less intensive than in forest parks. Legitimate usage by the public will continue to be facilitated by the creation of more forest parks as the need for them arises, and by the declaration of recreation areas in other forests, where for one reason or another the creation of a forest park over the whole area is not desirable.

Two problems in the administration and usage of indigenous State forests for recreational purposes are giving cause for increasing concern. The first involves the question of access and has to do with the difficulties which some sections of the public are experiencing in securing legal access to forest boundaries. In some cases paper roads exist but they are either undefined or physically impossible to traverse; in others there is no legal access at all. In many instances there is a good working arrangement between the landowners whose properties must be crossed and the public who wish to gain access to State forest land beyond; unfortunately there are vandals amongst some of the recreational users, and their activities

naturally make it more difficult for the responsible majority to obtain universal co-operation. Unfortunately, also, a small minority of landowners are unreasonably unco-operative and will not allow the passage even of organised and responsible Forest Service - sponsored club parties. It is hoped that these differences can be resolved, particularly when access to popular State forest parks is at stake.

The other difficulty arises from restrictions on right of access into publicly owned domestic water supply catchments. This problem is being studied by the authorities responsible for water purity as well as the Forest Service and the users themselves. It is to be hoped that some solution can be found which will safeguard public health but still allow some public use of water supply catchments.

Previous annual reports have commented on the increasing use being made of exotic forests for recreation. This usage continues to expand, particularly at Whaka, Kaingaroa, Hanmer, Tairua, and Dusky forests. So popular are the forest walks and pony trails in Hanmer and Whaka forests that one wonders whether their tourist potential has been fully realised by those in charge of the tourist industry.

The Forest Service has been late to appreciate how important mature exotic forests can be for leisure and recreational activities. Because the trend is so obviously a growing one it is now accepted that planning for future recreational needs should be part of the overall planning for newly established forests. In the future this will become routine practice.

NOXIOUS ANIMALS CONTROL

Departmental operations—A serious shortage of experienced hunters is making it increasingly difficult to control noxious animals in areas of high erosion hazard. It is imperative that this problem should be solved. Despite the assistance which sportsmen and commercial hunters give, it is still apparent that departmental operations must continue in the priority areas of concern to the Forest Service if animal numbers are to be reduced to acceptable levels. The evaluation of control efforts and the assessment of catchment condition is a valuable service undertaken by research staff (see p. 30).

It is pleasing to record that in some priority areas animal control has reached the stage at which mountain land rehabilitation through planting and sowing can proceed with much greater chances of success. In general, due to the combined efforts of deerstalkers, commercial hunters, and the Forest Service, animal numbers are lower than they have been for years.

Brief accounts of noxious animal control in each conservancy follow:

Auckland—Further intensive hunting to eliminate feral goats from Pirongia Forest was carried out with satisfactory results. At the request of the Department of Lands and Survey these operations were extended to embrace the nearby Te Kauri Park Scenic Reserve. Although goat numbers have been substantially reduced, further work remains to be done in these areas.

Representations were made to the Forest Service about damage by noxious animals to water supply catchment areas in the Kaimai Ranges. A comprehensive survey revealed that goats were indeed preventing regeneration in areas subject to slipping, and control operations will now take place.

Rotorua—Analysis of the assessment programme implemented 3 years ago provides proof that deer numbers in the Urewera highlands are showing a marked decline. These findings, combined with increasing activity by private and commercial hunters, have permitted a further reduction in Forest Service hunting staff. Goats have now been virtually eliminated over large areas, and this has allowed more emphasis to be placed on deer control, to which the private hunter can contribute more effectively. A hard core of experienced Forest Service hunters is still required to maintain pressure on deer in the more remote parts of Urewera National Park and for goat control generally.

Wellington—Hunting operations were maintained in the high priority regions of the Kaweka, Ruahine, and Tararua ranges. Past campaigns have reduced animal populations, which are now considered to be at a controllable level. Further revegetation of eroding areas will be undertaken.

In the Egmont National Park a shortage of experienced hunters with dogs caused some lessening of pressure on feral goat populations. The noxious animals control plan for this area is currently being revised.

Nelson—Hunting operations now follow a pattern of regular patrolling to maintain the populations at a low level. Poisoning with natural vegetation baits has supplemented hunting in some forested regions. This technique has proved effective in dealing with low animal populations in the drier beech forests of Marlborough, where it is difficult to maintain a satisfactory rate of progress by hunting. Continuing hunting pressure will be necessary to protect young exotic forests being established for erosion control.

Hokitika—Experienced hunters capable of working efficiently against low-density animal populations in the rugged terrain of the Hokitika River system are difficult to recruit. Attempts have been made to encourage helicopter firms to operate, but most find the area uneconomic. On present evidence, it appears that the solution may rest in some form of joint helicopter operations for maintenance of control above the bushline, with a combination of official ground hunter control and poisoning in the forested regions.

Canterbury—During the year a start was made in reducing noxious animal populations in the Seaward Kaikoura Range, where there are some serious erosion problems. A successful helicopter shoot with the primary objective of reducing thar numbers was undertaken, in all river headwaters from the Rakaia River to Mt. Cook. In this operation special attention was given to several thousand acres of the Murchison valley in the Mt. Cook National Park which was accidentally burnt the previous year. A large number of thar were destroyed in this area.

It has proved difficult to maintain continued hunting pressure on noxious animal populations in the high priority Waimakariri catchment. Commercial helicopter firms have shown spasmodic interest, but the intensity of their operations is not sufficient to maintain animals at the level necessary for vegetation recovery, itself a long-term process in dry Canterbury beech forests.

Southland—In the high priority Eyre and Takitimu Mountains continued noxious animals control has permitted steady progress with revegetation of eroding areas.

In the Wakatipu region a further helicopter sweep was made against goats in the Shotover, Dart, and Matukituki valleys. This operation was undertaken in February–March, when goats were living at high altitudes and were vulnerable to helicopter control. These operations have substantially reduced the goat population.

The campaign designed to protect the takahe habitat has continued in the Murchison Range within Fiordland National Park.

Venison for export—In the past year the principal South Island companies using helicopters for the recovery of game meat appear to have reached agreement on sharing the important operational areas. Fewer helicopters are now involved, but there is some indication that even these are having difficulty in maintaining their past rate of venison recovery.

There is still a strong overseas demand for New Zealand venison. The prices being paid by collecting agents in New Zealand have been maintained and hunting remains attractive to all classes of hunters. The high prices and consequent high kill are believed to be masking a general reduction in animal populations; the quantity of venison will decline noticeably over the ensuing year.

Helicopter companies have been operating in areas formerly not considered economic, and there has been some criticism of this by those hunting for sport. In recognising the contribution of commercial hunters in noxious animals control, the Forest Service will endeavour to balance the contribution made by the game export industry with that of private recreational hunters. Both have an important role to play.

Noxious animals in captivity—Since the Noxious Animals in Captivity Regulations, Deer Farming Regulations, and Zoological Gardens Regulations were gazetted in 1969 there has been a steady increase in applications to hold noxious animals in captivity. The main interest is in the northern part of the North Island. The reason could be that commercial hunting for wild deer is still a profitable venture in the South Island, whereas in the North there are no large reservoirs of wild deer.

The cost of fencing required by regulation has discouraged some would-be deer farmers and has restricted those seriously attempting to farm deer. At present 33 persons have the necessary authorities. Four of the earlier established farms hold from 150 to 400 deer, but most are only recently established and have fewer than 50 breeding animals.

There has also been a substantial increase in the number of applications by individuals and various organisations to hold noxious animals in urban areas for public display and in class B zoological gardens. Certain species held in approved enclosures have considerable public appeal, but there is concern that some organisations object to complying with the appropriate regulations. We must ensure that noxious animals do not escape and establish breeding populations in areas at present clear of them; the result could be further costly animal control operations.

Fifty-seven permits to hold noxious animals as household or farm pets have been issued since the Noxious Animals in Captivity Regulations were gazetted.

SOIL AND WATER CONSERVATION

River-control scheme near Kaikoura—Last year the Cabinet decision on a $1.2 million Kaikoura scheme was noted as an item of importance in the soil conservation field. The erosion control work required in the upper catchments of the Kowhai River is mainly in Mt. Fyffe State Forest and this work, estimated to cost $218,000, has been made the responsibility of the Forest Service by resolution of the Soil Conservation and Rivers Control Council. A start has been made on work at Mt. Fyffe; 2 miles of mountain access road were constructed, and large-scale field trials of aerial seeding and tree planting were carried out.

This is the first time that the Forest Service has been directly concerned with counter-erosion revegetation work in upper catchments as part of an overall river-control scheme approved by a catchment authority.

Protection forest planting—Revegetation work continued in other priority mountain catchments, e.g., in the Ruahine, Tararua, Kaweka, Rimutaka, and Takitimu ranges, and in the Waimakariri and Wairau catchments. More than 300,000 trees and cuttings were planted and 800 lb (363 kg) of seed was sown. This work, together with the protective planting and slip stabilisation carried out on the two forests established to give effect to the Poverty Bay - East Cape scheme, shows that the Forest Service, with the limited finance available, is proceeding as rapidly and as energetically as possible in what it regards as a most important field. The work in effect gives official recognition to the Forestry Development Conference recommendation requesting urgency for the planting of up to 20,000 acres (8,094 ha) annually of protection forests, and indicates that a start has been made in implementing it. It can now be claimed that at last the delicate tree of protection forests research, carefully planted and nurtured over many years by the Forest Service, is beginning to bear practical fruit. As a result it will be possible for counter-erosion revegetation work to be carried out more efficiently and on a much larger scale.

Sand dune protection—The Forest Service has carried out coastal sand stabilisation for many years, but has used funds for and reported on this work in the production forestry section. Although much of the stabilised dunes will provide timber, it has been decided that the stabilised and planted area which will not be productive—usually a coastal belt of some 10 to 15 chains (200 to 300 metres) wide—will henceforth not be recorded in the "stocked, productive area" statistics. To do otherwise is misleading.

HONORARY FOREST RANGERS

The Forest Service acknowledges the contribution honorary forest rangers make to the general welfare of the public using millions of acres of forests for recreation and enjoyment. It has long been felt, however, that the potential of the present force of honorary rangers is not being fully utilised and that existing policies and the duties and responsibilities of the present honorary ranger group are all in need of review.

Honorary rangers appointed in future will operate within the terms of a recently approved policy guideline which will ensure that only experienced, dedicated, and active forest users will be considered for

appointment. They will be engaged primarily to help protect forests, improve public relations, and aid forest management in areas receiving recreational use by the public. They will also be encouraged to observe and report on forest conditions, fires, and unauthorised fellings and assist with the prevention of vandalism to forest facilities and equipment.

Honorary rangers will be kept informed of policy changes and new legislation affecting their activities, and they will be asked to forward brief reports of observations to their conservators. They will also be invited to attend periodic field days, which will highlight current problems and help to form an amicable and efficient relationship between them and the Forest Service.

With the progressive establishment of State forest parks throughout the country and increasing general public use of other forest areas for recreation, it is expected that the steps now being taken to utilise fully the voluntary assistance provided by honorary forest rangers will prove of immense value to the Forest Service and the general public

OTHER ACTIVITIES

RETIREMENT OF DIRECTOR-GENERAL

Mr A. L. Poole, Director-General of Forests since February 1961, retired on 29 January 1971. This service and that as Assistant Director of Forestry from 1951 encompassed a period of rapid and intensive forestry development in all aspects of the department's activities—production forestry, protection forestry, utilisation, and research. Mr Poole's leadership of the Forest Service through these critical years was recognised by the award to him of a C.B.E.

Mr A. P. Thomson, Deputy Director-General, succeeded Mr Poole, and Mr M. J. Conway, formerly Director of Forest Management, became Deputy Director-General.

TRAINING

Forestry education—All professional forestry training is now being undertaken at the University of Canterbury School of Forestry, and the first foresters from the school will graduate at the end of 1971. The Forest Service has 19 students at the School of Forestry, with a further 29 undertaking intermediate studies at various universities.

Post-graduate training and experience have been gained during the year by nine officers, who were either attending overseas universities or undertaking overseas study tours—four in the United States, four in Canada, and one in Australia. Of these, five were scientists and four were foresters.

In 1968 the 2-year departmental forest ranger training programme was replaced by the Technicians' Certification Authority Forest Ranger Certificate course, and in January 1971 the first group of 11 ranger trainees completed their training under the new scheme. As expected, the forest industry has taken advantage of this new course and, in addition to Forest Service students, there have been 10 enrolled from private industry and one from overseas.

Correspondence teaching of the certificate course was begun on a trial basis in 1969 to satisfy a limited demand from those who could not attend full time, and in 1970 the first two students completed their examinations, with commendable results.

Block courses for Forest Service and industry students studying forestry subjects for New Zealand Certificates in Science and in Draughting were also conducted at the Forestry Training Centre.

Training for industry—Industry support for courses available at the Timber Industry Training Centre, Rotorua, has continued. Standard formal courses have been interspersed with short courses—some of wide interest, such as chain-saw operation and maintenance, and some for specialised subjects, such as the use and maintenance of carbide-tipped saws and carbide cutters.

During the year the officer in charge of the centre was awarded a Sir David Henry Scholarship, which enabled him to visit technical training institutions in Europe and North America. The information and material gathered will be of advantage in planning the further development of technical training for the primary and secondary wood-using industries

in New Zealand. Since its inception the centre has concentrated on training to upgrade the skills of existing tradesmen and operators, and although this need will continue, planning is already under way for longer-term certificate courses to qualify employees and intending employees for higher technical and technical-management positions.

Training courses offered by the Utilisation Development Division were again well supported by industry. The demand for courses on the various technical aspects of wood production, processing, and use is increasing with the greater awareness of the need for better control of the quality of timber going into building construction. There were five residential and five local courses in 1970–71, covering grading, seasoning, preservation, and a number of allied topics. Support for the courses comes from a wide range of producer and user groups, such as sawmillers, merchants, joiners, manufacturers, Government and local-body building inspectors, and tutors from technical institutes. Builders, however, generally give little support, which may suggest that an approach at the apprentice level at the technical institutes may be the best way of reaching this group.

The Forest Service training programmes in which the forest and wood-using industries are participating to an increasing degree cover only those subjects in which formal training is not available elsewhere. There is a growing need for a wider range of training of this nature and the work of the education and training working party of the Forestry Development Council will clarify priorities for this further development.

STAFF

The total number of staff employed increased by 2.5 percent over the previous year. The average annual rate of increase over the past 5 years has been only 4.2 percent. This is considered a very modest increase, having regard to the spectacular growth in operations, particularly in forest establishment and revenue-producing utilisation, over the same period.

Several senior professional and managerial positions were filled during the year. A notable and reassuring feature was the quality of many of the applicants. The Forest Service is fortunate in having almost a surfeit of talent in its middle to senior professional groups. There is no doubt that the recruitment and training programmes begun shortly after the Second World War attracted a very high standard of young men to forestry in both the professional and general divisions. As a result, the service can be assured that officers of high technical and administrative ability will be available to handle the increasingly demanding tasks of the future.

The situation is less satisfactory for junior supervisors, tradesmen, and clerical workers. The department continues to experience difficulty in recruiting and holding sufficient personnel in these key groups.

COMPUTER PROCESSING

During the year the Head Office EDP section was substantially expanded by increasing the systems planning staff with two professional foresters and one O and M officer.

The system for evaluating the Westland/Nelson and Southland beech resources made considerable progress and is now producing the basic resource information on which subsequent economic evaluations will be based. The compartment record information system, the log weight / volume analysis system, and the basic considerations for a standard coding system were started.

Much progress was made in converting existing systems from the Elliott 503 computer to the much more powerful and flexible Government Computer Centre ICL 1903A machine in Wellington.

The Forest Research Institute is now linked to the ICL 1903A machine by way of a remote terminal. The Head Office section is due to receive a similar terminal later in 1971, and this will greatly enhance the speed of systems completion and data throughput.

These improved facilities of staff and machines will enable a better servicing of the increasing Forest Service computer needs.

OVERSEAS VISITS

The Director-General attended the 1970 South Pacific Commission Technical Meeting on Forestry held in New Caledonia. The Director of Forest Management visited Thailand to consider with senior officials of Asian countries recommendations on the development of forest-based industries in South-east Asia made by a 1968 ECAFE fact-finding team (of which he was the leader). On an extensive tour including Japan, the United Kingdom, the United States, Tahiti, and Turkey, the Director of the Utilisation Development Division carried out important investigations into wood specifications, metrication in the timber industry, and international timber quarantine; he also took part in the general assembly and technical meetings of the International Standards Organisation (ISO) held in Ankara. (See page 34.) The Director of Engineering and two other officers visited a Forest Industries Machinery Exposition in Australia. The Chief Telecommunications Engineer visited the United States and Canada to study the latest applications of electronics to forestry, particularly communications in fire protection. Other officers attended scientific and forestry conferences in the United States and Australia, and there were the usual exchange visits to Australia by scientists of the Forest Research Institute.

The General Manager of the Commercial Division visited Japan and South Korea to negotiate sales contracts, and an officer attended the annual New Zealand - Australia Free Trade Agreement (NAFTA) talks in Canberra.

EXTERNAL AID

The Forest Service continued to be active in providing overseas technical assistance. The Director-General made a visit to Tonga to advise its government on the implementation of recommendations made in a Food and Agriculture Organisation (FAO) report on *Forestry in Tonga*. Costs for the visit were met by the Commonwealth Education Scheme. The Deputy Director-General spent 3 months in Yugoslavia as a senior FAO consultant to an FAO/UNDP forest and forest-industries project in that country. The Assistant Director of Research (Forest Products Branch) spent a short time in Samoa, discussing with officials provision

for a long-term research effort on local timbers. A senior forester visited Nepal to conduct, on behalf of FAO, a preliminary survey into a possible reforestation project there.

The officer seconded last year to help establish and organise a forestry training centre in Thailand is continuing his assignment. A scientist has been granted leave for a 2-year period to undertake an assignment for FAO in the Philippines. Two forest rangers have been serving with Volunteer Service Abroad in the Pacific.

Training and experience in New Zealand under FAO and Colombo Plan aid programmes were provided during the year for forest officers from Malaysia, India, South Korea, Guyana, Fiji, and the Philippines, for periods ranging from 1 to 12 months.

APPENDIX 1

Area of State Forest Land as at 31 March 1971

(Area in acres)

Conservancy	Permanent State Forest		Provisional State Forest		Total Area of State Forest Land	State Forest Land as Percentage of Total Land Area
	Ordinary	National Endowment	Ordinary	National Endowment		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Auckland ..	761,927	89,012	63,296	4,163	918,399	11.8
Rotorua ..	777,887	279,995	173,020	59,009	1,289,912	16.5
Wellington ..	1,241,618	41,466	37,394	3,152	1,323,632	10.2
Nelson ..	1,767,534	497,214	450,414	227,753	2,942,917	42.0
Westland ..	949,546	425,872	345,328	147,764	1,868,512	48.4
Canterbury ..	603,724	3,647	496	..	607,867	6.1
Southland ..	615,763	56,233	506,500	13,740	1,192,237	7.0
Total ..	6,717,999	1,393,439	1,576,448	455,581	10,143,476*	15.3

*Excludes 197,623 acres administered as State forest land.

Reservations and Withdrawals

	Acres
Land placed under State reservation	42,673
Areas withdrawn from reservation comprised—	
For settlement	5,686
For national parks	..
For roads	213
Other	3,183

APPENDIX 2

New Area Planted in State Exotic Forests—by Species

(Area in acres)

Year Ended 31 March	Radiata pine	Douglas fir	Corsican pine	Other	Total
(1)	(2)	(3)	(4)	(5)	(6)
1951 ..	730	680	550	2,130	4,090
1952 ..	2,260	550	710	1,510	5,030
1953 ..	2,690	850	910	1,220	5,670
1954 ..	2,860	740	430	900	4,930
1955 ..	2,960	1,320	480	550	5,310
1956 ..	4,260	1,200	550	690	6,700
1957 ..	3,740	1,680	640	940	7,000
1958 ..	3,920	2,320	1,010	1,230	8,480
1959 ..	2,130	2,090	1,480	1,420	7,120
1960 ..	2,560	1,680	1,080	1,830	7,150
1961 ..	4,760	2,120	880	1,880	9,640
1962 ..	6,550	2,260	1,490	1,470	11,770
1963 ..	9,080	1,850	2,030	2,220	15,180
1964 ..	12,540	1,840	2,096	1,916	18,392
1965 ..	14,695	3,881	1,361	1,498	21,435
1966 ..	15,110	3,048	2,085	304	20,547
1967 ..	15,220	4,113	1,143	747	21,223
1968 ..	17,762	4,962	427	722	23,873
1969 ..	25,303	5,909	671	1,452	33,335
1970 ..	29,024	5,353	474	1,687	36,538
1971 ..	31,317	3,545	240	1,314	36,416

APPENDIX 3

Establishment and Clear Felling in State Exotic Forests as at 31 March 1971—(a) by Forests

North Island

(Area in acres)

Conservancy and Forest	Stocked Area at 31 March 1970	Operations During Year			Other Changes in Stocked Area	Stocked Area at 31 March 1971	Area Waiting Restocking	Total Productive Area
		New Area Planted	Former Productive Areas Restocked By Planting	Area Clear Felled with Yield				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Auckland—								
Athenree ..	1,395	..	119	20	— 13	1,481	24	1,505
Aupouri ..	3,227	937	..	44	+ 3	4,123	187	4,310
Glenbervie ..	4,756	544	..	2	— 1	5,297	..	5,297
Great Barrier ..	96	..	..	..	+ 6	102	..	102
Herekino ..	144	..	..	..	..	144	..	144
Hurakia ..	546	..	..	..	..	546	..	546
Katikati ..	47	..	..	..	..	47	..	47
Kauaeranga ..	1,121	..	..	..	— 28	1,093	..	1,093
Mangawhai ..	653	302	..	..	— 1	954	..	954
Maramarua ..	10,822	..	355	257	— 114	10,806	433	11,239
Omahuta ..	1,215	..	..	..	..	1,215	..	1,215
Puhipuhi ..	1,280	..	5	15	— 4	1,266	146	1,412
Puketi ..	266	..	..	..	..	266	..	266
Pureora ..	4,883	150	..	..	..	5,033	..	5,033
Raetea ..	14	..	..	..	..	14	..	14
Riverhead ..	9,968	..	590	475	— 81	10,002	670	10,672
Russell ..	94	..	..	..	..	94	..	94
Tairua ..	14,766	874	..	..	—1,047	14,593	1,156	15,749
Tanui-Kawhia ..	..	18	..	..	..	18	..	18
Waipoua ..	5,209	..	107	126	— 1	5,189	169	5,358
Waitangi ..	3,276	203	..	..	..	3,479	5	3,484
Waiuku ..	2,595	..	13	46	— 10	2,552	137	2,689
Whangapoua ..	4,750	802	..	..	..	5,552	..	5,552
Woodhill ..	12,905	1,151	..	123	— 114	13,819	123	13,942
Total ..	84,028	4,981	1,189	1,108	—1,405	87,685	3,050	90,735
Rotorua—								
Haparangi ..	562	..	..	..	+ 9	571	..	571
Horohoro ..	1,594	529	..	..	..	2,123	..	2,123
Kaingaroa ..	303,341	2,264	4,855	5,706	—3,067	301,687	7,646	309,333
Lake Taupo ..	1,341	4,231	..	..	..	5,572	..	5,572
Mangatu ..	12,480	1,417	..	..	— 385	13,512	..	13,512
Marotiri ..	394	..	9	..	— 20	383	..	383
Patunamu ..	4,170	232	..	20	— 1	4,381	..	4,381
Rotoehu ..	11,427	305	184	143	..	11,773	62	11,835
Ruatoria ..	407	682	6	..	— 6	1,089	..	1,089
Tihoi ..	812	262	..	..	+ 3	1,077	..	1,077
Whaka ..	9,226	214	269	267	— 258	9,184	190	9,374
Whaerata ..	2,961	313	..	..	..	3,274	..	3,274
Whirinaki ..	4,795	345	20	..	— 46	5,114	..	5,114
Total ..	353,510	10,794	5,343	6,136	—3,771	359,740	7,898	367,638
Wellington—								
Erua ..	4,175	..	..	..	..	4,175	18	4,193
Esk	5,690	742	..	..	+ 7	6,439	..	6,439
Gwavas ..	8,812	632	..	41	— 3	9,400	41	9,441
Karioi ..	16,540	2	107	280	+ 53	16,422	860	17,282
Kaweka ..	4,250	1,959	..	..	+ 10	6,219	..	6,219
Lismore ..	2,889	421	..	..	+ 1	3,311	..	3,311
Mohaka ..	5,809	1,101	..	..	— 7	6,903	..	6,903
Motuiti ..	13	..	..	..	..	13	17	30
Mount Bruce ..	33	..	..	..	..	33	..	33
Ngaumu ..	12,436	710	12	..	+ 364	13,522	..	13,522
Rangataua ..	880	..	..	..	..	880	..	880
Ruahines ..	289	..	..	..	..	289	..	289
Santoft ..	4,307	211	..	90	..	4,428	434	4,862
Tangimoana ..	266	..	..	..	..	266	1	267
Tararua ..	881	..	..	..	..	881	..	881
Te Wera ..	2,216	79	..	..	..	2,295	..	2,295
Tinui	54	..	..	..	+ 3	57	..	57
Tongariro ..	2,581	..	..	..	..	2,581	..	2,581
Waitarere ..	2,560	231	75	38	+ 5	2,833	112	2,945
Waituhi ..	135	316	..	..	+ 17	468	..	468
Total ..	74,816	6,404	194	449	+ 450	81,415	1,483	82,898
Total North Island, year ended 31 March—								
1971	22,179	6,726	7,693		—4,726	528,840	12,431	541,271
1970	20,989	3,192	6,463		—1,336	512,354	8,380	520,734
1969	19,477	5,621	5,652		—1,632	495,972	4,501	500,473
1968	14,278	5,332	5,154		— 73	478,158	5,388	483,546
1967	12,760	4,634	4,930		—1,763	463,775	4,920	468,695

APPENDIX 3—continued

Establishment and Clear Felling in State Exotic Forests as at 31 March 1971—(a) by Forests—*continued*

South Island

(Area in acres)

Conservancy and Forest	Stocked Area at 31 March 1970	Operations During Year			Other Changes in Stocked Area	Stocked Area at 31 March 1971	Area Waiting Restocking	Total Productive Area
		New Area Planted	Former Productive Areas Restocked By Planting	Area Clear Felled with Yield				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Nelson—								
Dumgree ..	121	..	..	12	..	109	..	109
Golden Downs ..	50,416	2,569	190	1,909	+ 256	51,522	2,246	53,768
Hira	1,751	954	..	..	− 9	2,696	..	2,696
Hukawai ..	358	..	..	..	..	358	..	358
Inangahua West	14	..	..	..	..	14	..	14
Motueka ..	4,081	429	..	..	+ 25	4,535	..	4,535
Rai-Whangamoa	5,544	416	..	10	..	5,950	..	5,950
Tawhai ..	1,027	101	..	..	..	1,128	4	1,132
Wairau ..	491	650	..	..	..	1,141	..	1,141
Total ..	63,803	5,119	190	1,931	+ 272	67,453	2,250	69,703
Westland—								
Granville ..	691	3	..	..	..	694	54	748
Hochstetter ..	2,531	339	..	..	..	2,870	..	2,870
Hohonu ..	120	..	..	..	..	120	..	120
Ianthe ..	295	20	..	..	+ 1	316	..	316
Kaniere ..	377	..	..	..	− 1	376	1	377
Mahinapua ..	2,089	..	..	5	..	2,084	15	2,099
Mawhera ..	1,608	190	11	..	+ 2	1,811	686	2,497
Nemona ..	1,805	84	..	..	..	1,889	..	1,889
Omoto ..	254	196	..	..	..	450	..	450
Paparoa ..	129	..	..	..	..	129	..	129
Waimea ..	2,155	355	..	..	..	2,510	..	2,510
Wanganui ..	61	..	..	..	..	61	..	61
Total ..	12,115	1,187	11	5	+ 2	13,310	756	14,066
Canterbury—								
Ashley ..	8,733	716	..	19	+ 236	9,666	68	9,734
Balmoral ..	18,964	138	264	171	− 9	19,186	566	19,752
Eyrewell ..	10,129	..	710	359	− 267	10,213	5,943	16,156
Hanmer ..	8,644	65	48	53	+ 330	9,034	91	9,125
Island Hills ..	293	134	..	..	..	427	..	427
Kakahu ..	2,651	172	..	..	− 11	2,812	22	2,834
Mt. Thomas ..	..	222	..	..	..	222	..	222
Omihi ..	2,468	148	..	..	− 43	2,573	345	2,918
Oxford ..	615	52	..	..	..	667	..	667
Pioneer Park ..	685	6	..	..	..	691	39	730
Raincliff ..	188	..	..	..	..	188	2	190
Total ..	53,370	1,653	1,022	602	+ 236	55,679	7,076	62,755
Southland—								
Beaumont ..	4,607	69	192	187	− 6	4,675	130	4,805
Berwick ..	10,355	907	255	..	− 266	11,251	..	11,251
Catlins ..	566	..	..	..	..	566	..	566
Conical Hill ..	4,050	20	127	138	..	4,059	157	4,216
Dusky ..	4,050	21	44	9	+ 3	4,109	..	4,109
Herbert ..	2,915	116	20	..	− 2	3,049	..	3,049
Hinahina ..	277	39	..	..	− 67	249	..	249
Hokonui ..	4,908	283	147	221	..	5,117	..	5,117
Longwood ..	2,962	932	63	..	..	3,957	..	3,957
Maclennan ..	4	..	..	..	..	4	..	4
Naseby ..	3,269	35	25	52	..	3,277	27	3,304
Otago Coast ..	6,446	1,325	..	..	..	7,771	..	7,771
Otautau ..	8	..	..	..	..	8	..	8
Rankleburn ..	5,376	438	..	..	..	5,814	..	5,814
Rowallan ..	877	579	..	..	..	1,456	..	1,456
Silver Peaks ..	482	221	..	..	..	703	..	703
Slopedown ..	1,610	542	..	..	− 762	1,390	762	2,152
Tapanui ..	1,965	..	..	46	..	1,919	46	1,965
Waikoata ..	..	295	..	..	− 43	252	..	252
Woodlaw ..	3,582	456	77	..	− 77	4,038	..	4,038
Total ..	58,309	6,278	950	653	−1,220	63,664	1,122	64,786
Total South Island, year ended 31 March—								
1971		14,237	2,173	3,191	− 710	200,106	11,204	211,310
1970		15,549	2,126	3,414	+ 221	187,597	8,286	195,883
1969		13,858	2,967	2,388	+1,103	173,115	8,108	181,223
1968		9,595	2,401	1,267	−2,079	157,575	10,824	168,399
1967		8,463	1,268	1,404	−2,688	148,925	11,443	160,368
Total New Zealand, year ended 31 March—								
1971		36,416	8,899	10,884	−5,436	728,946	23,635	752,581
1970		36,538	5,318	9,877	−1,115	699,951	16,666	716,617
1969		33,335	8,588	8,040	− 529	669,087	12,609	681,696
1968		23,873	7,733	6,421	−2,152	635,733	16,212	651,945
1967		21,223	5,902	6,334	−4,451	612,700	16,363	629,063

APPENDIX 3—continued

Establishment and Clear Felling in State Exotic Forests as at 31 March 1971—(b) by Species

(Area in acres)

Conservancy and Species	Stocked Area at 31 March 1970	Operations During Year			Other Changes in Stocked Area	Stocked Area at 31 March 1971
		New Area Planted	Former Productive Areas Restocked by Planting	Area Clear Felled with Yield		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Auckland—						
Radiata pine ..	58,151	4,498	1,082	798	+ 277	63,210
Douglas fir ..	3,580	..	..	..	+ 1	3,581
Corsican pine ..	6,086	..	..	119	— 202	5,765
Other species ..	16,211	483	107	191	— 1,481	15,129
Total ..	84,028	4,981	1,189	1,108	— 1,405	87,685
Rotorua—						
Radiata pine ..	181,703	9,364	5,040	4,498	— 2,521	189,088
Douglas fir ..	53,276	1,097	205	183	— 704	53,691
Corsican pine ..	32,642	..	..	685	— 169	31,788
Other species ..	85,889	333	98	770	— 377	85,173
Total ..	353,510	10,794	5,343	6,136	— 3,771	359,740
Wellington—						
Radiata pine ..	33,549	5,315	194	174	+ 612	39,496
Douglas fir ..	12,812	955	..	..	— 164	13,603
Corsican pine ..	7,280	..	..	113	— 18	7,149
Other species ..	21,175	134	..	162	+ 20	21,167
Total ..	74,816	6,404	194	449	+ 450	81,415
Nelson—						
Radiata pine ..	38,645	4,365	52	1,078	+ 455	42,439
Douglas fir ..	11,035	707	138	45	..	11,835
Corsican pine ..	7,569	..	..	398	..	7,171
Other species ..	6,554	47	..	410	— 183	6,008
Total ..	63,803	5,119	190	1,931	+ 272	67,453
Westland—						
Radiata pine ..	7,108	1,080	11	5	+ 47	8,241
Douglas fir ..	1,041	..	..	..	— 27	1,014
Corsican pine ..	296	..	..	..	..	296
Other species ..	3,670	107	..	..	— 18	3,759
Total ..	12,115	1,187	11	5	+ 2	13,310
Canterbury—						
Radiata pine ..	29,237	1,062	1,022	513	— 40	30,768
Douglas fir ..	5,137	352	..	1	+ 29	5,517
Corsican pine ..	10,596	197	..	19	— 22	10,752
Other species ..	8,400	42	..	69	+ 269	8,642
Total ..	53,370	1,653	1,022	602	+ 236	55,679
Southland—						
Radiata pine ..	34,068	5,633	885	344	— 1,146	39,096
Douglas fir ..	7,158	434	29	3	— 59	7,559
Corsican pine ..	9,978	43	5	65	+ 3	9,964
Other species ..	7,105	168	31	241	— 18	7,045
Total ..	58,309	6,278	950	653	— 1,220	63,664
New Zealand—						
Radiata pine ..	382,461	31,317	8,286	7,410	— 2,316	412,338
Douglas fir ..	94,039	3,545	372	232	— 924	96,800
Corsican pine ..	74,447	240	5	1,399	— 408	72,885
Other species ..	149,004	1,314	236	1,843	— 1,788	146,923
Total ..	699,951	36,416	8,899	10,884	— 5,436	728,946

Notes—(1) Non-productive afforestation for erosion control is excluded from this appendix.
(2) "Other changes" (column 6) includes purchase or sale of stocked forest, previous year's seeding or regeneration now considered established, clear felling without yield, losses due to fire, corrections due to resurvey, etc.

APPENDIX 4

Pruning and Thinning in State Exotic Forests for the Year Ended 31 March 1971

(Area in acres)

Conservancy and Species	Pruning					Thinned During Year	
	Area Pruned During Year			Total Pruned Area to Date			
	Total Area Pruned	To First Log	To Second Log	To First Log	To Second Log	With Yield	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auckland—							
Radiata pine ..	1,658	220	..	12,058	1,945	930	741
Douglas fir ..	..	..	..	152	..	..	..
Corsican pine ..	..	..	..	1,191	..	..	..
Other species ..	224	..	..	4,164	357	29	..
Total ..	1,882	220	..	17,565	2,302	959	741
Rotorua—							
Radiata pine ..	13,856	4,071	..	23,060	1,272	2,132	10,464
Douglas fir ..	..	..	..	10,012	17	1,616	..
Corsican pine ..	..	..	..	5,307	131	22	..
Other species ..	32	..	..	6,780	22	78	4
Total ..	13,888	4,071	..	45,159	1,442	3,848	10,468
Wellington—							
Radiata pine ..	3,862	948	..	8,103	151	1,184	346
Douglas fir ..	1	..	..	721	..	12	..
Corsican pine ..	..	..	..	592	270	18	..
Other species ..	73	..	..	6,176	24	20	206
Total ..	3,936	948	..	15,592	445	1,234	552
Nelson—							
Radiata pine ..	2,950	503	..	3,942	534	3	876
Douglas fir ..	41	40	..	2,735	1	52	..
Corsican pine ..	..	..	..	4,684	935	..	..
Other species ..	..	..	..	200	..	2	..
Total ..	2,991	543	..	11,561	1,470	57	876
Westland—							
Radiata pine ..	263	19	..	385	128	..	37
Douglas fir ..	..	..	..	80	..	..	..
Corsican pine ..	50	..	..	..	..	..	..
Other species ..	..	..	..	390	..	..	..
Total ..	313	19	..	855	128	..	37
Canterbury—							
Radiata pine ..	1,288	724	..	2,644	1,443	314	509
Douglas fir ..	28	11	..	439	..	17	22
Corsican pine ..	34	12	..	2,878	6	103	21
Other species ..	52	6	..	675	4	51	70
Total ..	1,402	753	..	6,636	1,453	485	622
Southland—							
Radiata pine ..	1,906	631	..	6,361	88	281	912
Douglas fir ..	12	..	..	623	..	40	3
Corsican pine ..	..	..	..	2,300	13	74	..
Other species ..	..	..	..	2,389	41	36	..
Total ..	1,918	631	..	11,673	142	431	915
New Zealand—							
Radiata pine ..	25,783	7,116	..	56,553	5,561	4,844	13,885
Douglas fir ..	82	51	..	14,762	18	1,737	25
Corsican pine ..	84	12	..	16,952	1,355	217	21
Other species ..	381	6	..	20,774	448	216	280
Total ..	26,330	7,185	..	109,041	7,382	7,014	14,211

Notes—(1) "Total Area Pruned" (column 2) includes pruning to intermediate steps, e.g., 0–9 ft, 18–27 ft.
(2) "To First Log" (columns 3 and 5) is pruning reaching 16–20 ft. "To Second Log" (columns 4 and 6) is pruning reaching 32 ft.
(3) Where pruning has gone from below first log up to second log in one operation the area has been included in columns (3) and (4).

APPENDIX 5

Protection Forestry—Principal Regions Under Control Operations, 1970–71

Region	Area (acres)	Control Objectives
Urewera forests, including Urewera National Park ..	1,659,000	Erosion and flood control.
Kaweka Range	278,000	,,
Egmont National Park ..	83,000	Protection of indigenous flora and fauna; soil and water conservation.
Ruahine Range	353,000	Erosion and flood control.
Tararua Range	235,000	,,
Wairau catchment	1,307,000	,,
Awatere-Clarence catchments	1,000,000	Reduce competition of noxious animals with domestic stock.
Motueka catchment ..	200,000	Erosion and flood control.
Buller catchment*	200,000	,,
Hokitika catchment.. ..	293,000	,,
Waiau catchment*	447,000	Reduce competition of noxious animals with domestic stock.
Hurunui catchment* ..	265,000	Erosion and flood control.
Waimakariri catchment ..	596,000	,,
Rakaia catchment*.. ..	349,000	,,
Rangitata catchment* ..	145,000	,,
Waitaki catchment* ..	991,000	,,
Murchison mountains, Fiordland National Park ..	130,000	Protection of indigenous flora and fauna (including takahe).
Eyre-Takitimu mountains ..	720,000	Erosion and flood control.
Total	9,251,000	

*Inspected annually—intermittent control where necessary.

APPENDIX 6

Total Timber Removals from Indigenous and Exotic State Forests for the Year Ended 31 March 1971

(Volume in thousand cubic feet)

Conservancy	Indigenous			Exotic			Grand Total
	Logs	Smallwood	Total	Logs	Smallwood	Total	
Auckland ..	2,814	1	2,815	6,846	849	7,695	10,510
Rotorua ..	5,781	36	5,817	70,408	1,541	71,949	77,766
Wellington ..	1,092	25	1,117	2,306	978	3,284	4,401
Nelson	2,023	43	2,066	13,154	107	13,261	15,327
Westland ..	5,845	27	5,872	36	..	36	5,908
Canterbury ..	..	..	..	3,893	402	4,295	4,295
Southland ..	1,345	6	1,351	5,110	579	5,689	7,040
Total—1970–71 ..	18,900	138	19,038	101,753	4,456	106,209	125,247
1969–70 ..	16,143	140	16,283	91,922	3,586	95,508	111,791
1968–69 ..	13,752	232	13,984	78,455	2,265	80,720	94,704

Notes—(1) This table shows all roundwood removed from State forests under licences, permits, and log sale agreements.
(2) Roundwood for particle board production is included with logs.

APPENDIX 7

Total Smallwood Removals from State Forests

(Volume in thousand cubic feet)

Category	Year Ended 31 March				
	1967	1968	1969	1970	1971
(1)	(2)	(3)	(4)	(5)	(6)
Posts—					
Indigenous	37	34	37	21	34
Exotic	1,439	1,283	1,681	2,760	3,547
Total	1,476	1,317	1,718	2,781	3,581
Other Fencing Material—					
Indigenous	96	77	33	28	31
Exotic	134	104	213	200	274
Total	230	181	246	228	305
Poles—					
Indigenous	5	6	2	..	2
Exotic	310	496	206	518	462
Total	315	502	208	518	464
Other—					
Indigenous	228	285	160	91	71
Exotic	287	192	165	108	173
Total	515	477	325	199	244
Total Smallwood—					
Indigenous	366	402	232	140	138
Exotic	2,170	2,075	2,265	3,586	4,456
Total	2,536	2,477	2,497	3,726	4,594

Note—Chipwood for particle board production is excluded from this table and is included with "Logs" in appendix 6.

APPENDIX 8

Total Timber Removals from State Indigenous Forests By Method of Sale for the Year Ended 31 March 1971

(Volume in thousand cubic feet; Value in $(000))

Conservancy	Logs		Smallwood		Total	
	Volume	Value	Volume	Value	Volume	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) *Sales of Standing Timber*						
Auckland	1,681	231	1	..	1,682	231
Rotorua	4,306	341	36	1	4,342	342
Wellington	1,092	158	25	3	1,117	161
Nelson	1,822	102	43	1	1,865	103
Westland	5,150	354	27	2	5,177	356
Canterbury	..	..	..	..	..	..
Southland	1,343	129	6	..	1,349	129
Total—1970–71	15,394	1,315	138	7	15,532	1,322
1969–70	13,286	1,265	140	8	13,426	1,273
1968–69	11,663	1,267	232	14	11,895	1,281
(b) *Sales of Logs*						
Auckland	1,133	389	..	..	1,133	389
Rotorua	1,475	444	..	..	1,475	444
Wellington	..	..	..	..	..	..
Nelson	201	26	..	..	201	26
Westland	695	158	..	..	695	158
Canterbury	..	..	..	..	..	..
Southland	2	..	..	..	2	..
Total—1970–71	3,506	1,017	..	..	3,506	1,017
1969–70	2,857	900	..	..	2,857	900
1968–69	2,089	652	..	..	2,089	652

Notes—(1) Logs include saw logs and peeler logs.
(2) Values of log sales are based on price points that vary from "on ride" to "on truck" to "delivered mill".

APPENDIX 9

Total Timber Removals from State Exotic Forests By Method of Sale for the Year Ended 31 March 1971

(Volume in thousand cubic feet; Value in $(000))

Conservancy	Logs		Smallwood		Total	
	Volume	Value	Volume	Value	Volume	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) *Sales of Standing Timber*						
Auckland	4,810	318	849	30	5,659	348
Rotorua	35,204	1,168	303	7	35,507	1,175
Wellington	1,575	91	974	68	2,549	159
Nelson	4,102	68	96	4	4,198	72
Westland	36	1	..	..	36	1
Canterbury	3,550	306	231	13	3,781	319
Southland	1,763	236	422	27	2,185	263
Total—1970–71	51,040	2,188	2,875	149	53,915	2,337
1969–70	46,082	1,908	2,260	102	48,342	2,010
1968–69	43,312	1,859	1,308	54	44,620	1,913
(b) *Sales of Logs*						
Auckland	2,036	388	..	..	2,036	388
Rotorua	35,204	4,843	1,238	199	36,442	5,042
Wellington	731	199	4	1	735	200
Nelson	9,052	2,172	11	1	9,063	2,173
Westland	..	..	..	..	..	..
Canterbury	343	47	171	30	514	77
Southland	3,347	580	157	52	3,504	632
Total—1970–71	50,713	8,229	1,581	283	52,294	8,512
1969–70	45,840	7,517	1,326	295	47,166	7,812
1968–69	35,143	6,431	957	208	36,100	6,639

Notes—(1) Logs include saw logs, pulp logs, and peeler logs.
(2) This appendix has been adjusted to exclude any log exports by contractors from sales of standing timber and to include them in the sales of logs. Tables (a) and (b) have been corrected for the years shown.
(3) Values of log sales are based on price points that vary from "on ride" to "on truck" to "delivered mill or wharf".
(4) Log sales of Douglas fir amounted to 10.2 million cu ft valued at $1.0 million.

APPENDIX 10

Removals of Exotic Roundwood from State Forests By Thinnings and Clear Fellings

(Volume in thousand cubic feet)

Forest	Year Ended 31 March 1971					1969–70
	Logs		Smallwood		Total	
	Thinnings	Clear Fellings	Thinnings	Clear Fellings		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Athenree	..	141	..	5	146	135
Aupouri	..	16	..	81	97	128
Glenbervie	9	12	90	6	117	52
Kauaeranga	..	..	..	..	..	..
Mangawhai	..	..	..	..	..	20
Maramarua	5	2,034	62	..	2,101	1,839
Omahuta	..	..	6	..	6	20
Puhipuhi	..	142	..	7	149	191
Riverhead	..	2,587	..	..	2,587	1,572
Tairua	..	..	..	..	..	75
Waipoua	..	19	..	122	141	77
Waitangi	5	..	60	..	65	71
Waiuku	159	137	238	36	570	993
Whangapoua	..	..	5	..	5	10
Woodhill	1,164	416	130	1	1,711	1,188
Others*	..	..	..	..	..	6
Kaingaroa	12,521	54,946	686	581	68,734	61,943
Mangatu	..	..	..	..	..	15
Patunamu	76	..	19	15	110	44
Rotoehu	298	924	83	16	1,321	1,171
Ruatoria	..	3	..	..	3	..
Whaka	754	886	8	133	1,781	1,848
Whirinaki	..	..	..	..	..	32
Esk	..	..	55	..	55	33
Gwavas	153	146	96	59	454	209
Karioi	59	1,135	35	238	1,467	1,285
Kaweka	..	24	..	..	24	..
Lismore	..	..	..	..	..	17
Motuiti	..	11	..	..	11	..
Ngaumu	..	..	320	..	320	185
Santoft	..	415	108	..	523	704
Tangimoana	..	..	..	..	..	..
Te Wera	..	..	8	..	8	23
Tongariro	..	..	..	3	3	5
Waitarere	186	177	57	..	420	316
North Island	15,389	64,171	2,066	1,303	82,929	74,207
Dumgree	..	45	..	7	52	10
Golden Downs	299	12,622	2	95	13,018	12,090
Rai-Whangamoa ..	..	189	1	..	190	..
Others*	..	..	1	..	1	20
Mahinapua	..	36	..	..	36	15
Ashley	42	172	45	3	262	272
Balmoral	8	790	36	20	854	249
Eyrewell	..	2,032	..	52	2,084	2,613
Hanmer	146	698	125	116	1,085	940
Omihi	3	..	6	..	9	34
Raincliff	1	..	..	..	1	..
Beaumont	..	1,646	..	..	1,646	1,741
Conical Hill	89	788	..	213	1,090	956
Dusky	140	154	..	4	298	613
Herbert	..	..	30	13	43	27
Hokonui	298	1,195	21	150	1,664	1,393
Longwood	..	..	49	..	49	76
Naseby	20	151	66	4	241	247
Tapanui	2	621	1	..	624	..
Others*	..	6	27	..	33	5
South Island	1,048	21,145	410	677	23,280	21,301
New Zealand	16,437	85,316	2,476	1,980	106,209	95,508

*Includes forests producing less than 10,000 cu ft.

APPENDIX 11

New Zealand Forest Service Sawmilling Operations

(a) *Production of Sawn Timber**

(Volume in thousand board feet)

Sawmill	Year Ended 31 December				
	1966	1967	1968	1969	1970
(1)	(2)	(3)	(4)	(5)	(6)
Waipa	31,700	30,358	40,329	45,354	44,977
Conical Hill	10,262	7,637	8,870	8,839	10,276
Total production ..	41,962	37,995	49,199	54,193	55,253

*Includes sleepers (205,000 bd ft in 1970).

(b) *Sales of Sawn Timber*

(Volume in thousand board feet)

Details	Year Ended 31 December				
	1966	1967	1968	1969	1970
(1)	(2)	(3)	(4)	(5)	(6)
New Zealand sales—					
Green	14,699	11,514	11,312	10,770	12,247
Air seasoned	3,064	2,431	1,948	2,262	3,527
Kiln dried	2,830	1,559	1,510	1,953	1,953
Treated—					
Wet	13,387	7,823	10,335	12,054	11,757
Dry	1,135	3,401	1,106	967	1,287
Total	35,115	26,728	26,211	28,006	30,771
Export Sales—					
Green	2,671	4,732	16,366	17,529	15,964
Air seasoned	4	53	185	145	3,529
Kiln dried	1,245	1,167	1,018	1,280	959
Treated	351	225	81	939	2,528
Total	4,271	6,177	17,650	19,893	22,981
Transfers to box factory ..	990	1,345	1,547	1,331	948
Grand total ..	40,376	34,250	45,408	49,230	54,700

(c) *Subsidiary Processing of Sawn Timber*

Year Ended 31 December 1970

	bd ft
Quantity kiln dried	7,150,000
Quantity dressed	15,479,000
Quantity preservative treated* ..	16,274,000

*For further details see appendix 12.

APPENDIX 12

Forest Produce Treated by the New Zealand Forest Service

(a) *Sawn Timber*

(Volume in thousand board feet)

Location of Plant and/or Year	Preservative				Total
	Boron	Creosote	Boliden	*PCP/Fuel Oil	
(1)	(2)	(3)	(4)	(5)	(6)
Waipa	9,600	..	3,885	61	13,546
Conical Hill	2,728	..	..	..	2,728
Total, year ended 31 December—					
1970	12,328	..	3,885	61	16,274
1969	12,202	..	3,974	58	16,234
1968	11,479	..	2,882	102	14,463
1967	8,898	..	2,731	79	11,708
1966	11,550	..	2,669	253	14,472

*Pentachlorophenol.

(b) *Other Timber*

Type and Year	Hanmer	Waipa		Total	
	*PCP/Fuel Oil	Boliden	*PCP/Fuel Oil	Quantity	Volume
(1)	(2)	(3)	(4)	(5)	(6)
	Quantities in thousands				000 cu ft
Poles	3.7	6.3	10.9	20.9	183.7
Stockyard posts	4.6	..	1.2	5.8	15.4
Fencing posts	91.6	242.5	114.0	448.1	311.7
Strainers	8.3	6.5	4.9	19.7	51.6
Stays	6.0	0.3	3.3	9.6	8.9
Sawn battens	..	511.3	..	511.3	47.4
Sleepers†	..	..	70.2	70.2	163.5
Other	..	4.8	3.9	8.7	18.8
Total, year ended 31 December—		(Volume in thousand cubic feet)			
1970	118	282	401	N.A.	801
1969	122	242	413	N.A.	777
1968	93	189	484	N.A.	766
1967	104	144	675	N.A.	923
1966	146	164	816	N.A.	1,126

*Pentachlorophenol. †Excluding rejects.

APPENDIX 13

Employment and Training

(a) *Staff and Labour*

Category	Strength, 31 March 1970	Commenced During Year	Left During Year	Strength, 31 March 1971
(1)	(2)	(3)	(4)	(5)
Staff	2,532	468	408	2,592*
Labour—				
Thinning, logging, milling ..	878	1,018	1,009	887
Other forestry operations ..	1,528	3,383	3,576	1,335
Control of noxious animals ..	97	217	227	87
Cadet woodsmen	..	111	21	90
Total	2,503	4,729	4,833	2,399
Total staff and labour ..	5,035	5,197	5,241	4,991

*Includes 47 on leave without pay and 3 on secondment. These have not been included in the estimates of expenditure.

(b) *Training*

Category	Year Ended 31 March		
	1969	1970	1971
(1)	(2)	(3)	(4)
Technical trainees—			
Recruited during year	41	43	45
Studying for degrees in New Zealand ..	39	29	58
Studying for degrees overseas	28	6	..
Under field training	51	50	62
At ranger schools	23	20	28
Research technicians—			
Recruited during year	14	16	16
Under training	43	56	38
Woodsmen—			
Recruited during year	91	121	111
At woodsmen schools	170	238	166
Clerical cadets—			
Recruited	25	27	18

REPORT OF THE AUDIT OFFICE

To the Director-General of Forests.

The Audit Office, acting under statutory authority, has audited the accounts of the Waipa Sawmill for the year ended 31 December 1970.

The audit included such reviews of the accounting procedures and tests of the accounting records and other supporting evidence as were considered necessary in terms of section 20, Public Revenues Act 1953. All the information and explanations required have been obtained. The financial transactions which have come under notice have been within statutory authority.

In the opinion of the Audit Office the attached balance sheet and accompanying accounts give a true and fair view of the state of affairs of the Waipa Sawmill as at 31 December 1970 and of the results of the financial operations for the year.

G. J. Connelly,
Deputy Controller and Auditor-General.

2 June 1971.

APPENDIX 14

Forest Service Sawmill Accounts

(A) Waipa Sawmill

(a) *Operating Account for Year Ended 31 December 1970*

Year Ended 31 December 1969			Year Ended 31 December 1970	
$	$		$	$
4,657,070		Purchase of materials	5,710,172	
1,500,209		Wages, salaries, and contract payments	1,942,236	
276,231		Depreciation	245,800	
1,218,763		Other expenses	1,316,554	
	7,652,273			9,214,762
7,769,754		Sales of sawn timber, box shooks, and round produce (net)	9,305,607	
263,773		Increase in stocks	224,242	
	8,033,527			9,529,849
	$381,254	Net profit transferred to Appropriation Account		$315,087

(b) *Profit and Loss Appropriation Account for Year Ended 31 December 1970*

$	$		$	$
381,254		Net profit from Operating Account	315,087	
..		Profit on sale and disposal of assets	5,061	
	381,254			320,148
		Less—		
57,110		Interest on capital	59,424	
9,716		Loss on sale and disposal of assets	..	
..		Payroll tax	2,326	
..		Transfer to fire insurance reserve	424	
	66,826			62,174
	314,428	Profit for year		257,974
	1,637,837	Balance 1 January 1970		1,952,265
	$1,952,265	Accumulated profits		$2,210,239

APPENDIX 14—continued

(A) Waipa Sawmill—*continued*

(c) Balance Sheet as at 31 December 1970

Year Ended 31 December 1969			Year Ended 31 December 1970	
$	$		$	$
		Current assets—		
		Sundry debtors—		
1,223,233		Trading accounts	1,074,359	
170,607		Other departmental undertakings	463,257	
1,393,840			1,537,616	
26,192		Insurance premium and other payments in advance	15,239	
1,420,032			1,552,855	
3,437		*Less* discount reserve	4,642	
1,416,595			1,548,213	
10,000		*Less* bad debt reserve	10,000	
	1,406,595			1,538,213
		Stocks and stores on hand (at cost)—		
7,170		Logs	40,245	
1,148,803		Sawn timber	1,262,491	
2,905		Box shooks	3,989	
53,746		Borax, pentachlorophenol	46,910	
7,845		Fuel oil	7,106	
40,714		Boliden salts	78,845	
127,412		Treated produce	157,384	
166,845		General stores	191,507	
82,818		Untreated produce	138,673	
	1,638,258			1,927,150
	3,044,853			3,465,363
		Fixed assets (at cost)—		
3,554,796		Plant	3,642,727	
2,257,414		*Less* provision for depreciation (ordinary)	2,374,254	
67,326		*Less* provision for depreciation (special)	67,128	
	1,230,056			1,201,345
1,286,583		Buildings	1,368,139	
569,934		*Less* provision for depreciation (ordinary)	602,689	
21,776		*Less* provision for depreciation (special)	21,776	
	694,873			743,674
106,462		Tools, furniture, and fittings	105,993	
54,283		*Less* provision for depreciation (ordinary)	56,085	
	52,179			49,908
604,353		Other installations	622,025	
234,303		*Less* provision for depreciation (ordinary)	243,051	
5,936		*Less* provision for depreciation (special)	5,936	
	364,114			373,038
	$5,386,075			$5,833,328
$	$		$	$
		Current liabilities—		
		Sundry creditors—		
923,581		Trade accounts	1,197,917	
..		Provision for taxation	..	
	923,581			1,197,917
		Funds and reserves—		
2,281,796		Advances of Government funds	2,198,885	
1,952,265		Accumulated profits	2,210,239	
200,000		Reserve for fire losses	200,000	
7,333		General reserve	7,333	
21,100		Reserve for fleet maintenance	18,954	
	4,462,494			4,635,411
	$5,386,075			$5,833,328

Certified correct—

A. W. Oakley, Sawmill Manager.

C. A. Cameron, Mill Accountant.

REPORT OF THE AUDIT OFFICE

To the Director-General of Forests.

The Audit Office, acting under statutory authority, has audited the accounts of the Conical Hill Sawmill for the year ended 31 December 1970.

The audit included such reviews of the accounting procedures and tests of the accounting records and other supporting evidence as were considered necessary in terms of section 20, Public Revenues Act 1953. All the information and explanations required have been obtained. The financial transactions which have come under notice have been within statutory authority.

In the opinion of the Audit Office the attached balance sheet and accompanying accounts give a true and fair view of the state of affairs of the Conical Hill Sawmill as at 31 December 1970 and of the results of the financial operations for the year.

G. J. Connelly,
Deputy Controller and Auditor-General.

2 June 1971.

APPENDIX 14—continued

(B) Conical Hill Sawmill

(a) *Operating Account for Year Ended 31 December 1970*

Year Ended 31 December 1969			Year Ended 31 December 1970	
$	$		$	$
270,884		Purchase of materials	297,114	
224,570		Wages, salaries, and contract payments	291,364	
38,225		Depreciation	37,722	
150,528		Other expenses	329,641	
	684,207			955,841
702,497		Sale of sawn timber	1,006,266	
24,763		Increase in stocks	34,624	
	727,260			1,040,890
	$43,053	Net profit transferred to Appropriation Account		$85,049

(b) *Profit and Loss Appropriation Account for Year Ended 31 December 1970*

$	$		$	$
43,053		Net profit from Operating Account	85,049	
587		Plus profit on sale and disposal of assets	..	
	43,640			85,049
		Less—		
13,450		Interest on capital	14,691	
..		Income tax provision	1,400	
	13,450			16,091
	30,190	Profit for year		68,958
	168,263	Balance brought forward from previous year		198,453
	$198,453	Accumulated profits		$267,411

APPENDIX 14—continued

(B) CONICAL HILL SAWMILL—*continued*

(c) *Balance Sheet as at 31 December 1970*

Year Ended 31 December 1969			Year Ended 31 December 1970	
$	$		$	$
		Current assets—		
		Debtors—		
143,488		Trading accounts	213,323	
12,554		Other departmental undertakings	17,085	
156,042			230,408	
1,144		*Less* discount reserve	929	
154,898			229,479	
3,000		*Less* bad debt reserve	3,000	
	151,898			226,479
		Stocks and stores on hand at cost—		
7,536		Logs	5,652	
210,933		Sawn timber	247,442	
2,825		Chemicals	1,356	
40,270		General stores	52,384	
	261,564			306,834
	413,462			533,313
		Fixed assets at costs—		
777,868		Plant	837,692	
389,843		*Less* provision for depreciation (ordinary)	415,556	
57,982		*Less* provision for depreciation (special)	57,982	
	330,043			364,154
439,329		Buildings	446,112	
167,810		*Less* provision for depreciation (ordinary)	178,758	
38,352		*Less* provision for depreciation (special)	38,352	
	233,167			229,002
15,724		Tools, furniture, and fittings	17,934	
6,485		*Less* provision for depreciation (ordinary)	6,140	
	9,239			11,794
193,618		Other installations	202,551	
53,104		*Less* provision for depreciation (ordinary)	54,165	
	140,514			148,386
	$1,126,425			$1,286,649
$	$		$	$
		Current liabilities—		
		Sundry creditors—		
103,504		Trading accounts	91,996	
..		Provision for taxation	1,400	
	103,504			93,396
		Funds and reserves—		
782,413		Advances on Government funds	884,971	
198,453		Accumulated profits	267,411	
31,713		Reserve for fire losses	31,713	
9,224		Reserves for fleet maintenance	8,040	
1,118		General reserve	1,118	
	1,022,921			1,193,253
	$1,126,425			$1,286,649

Certified correct—

J. D. COYLE, Sawmill Manager.
J. C. WILLIAMS, Secretary-Accountant.

REPORT OF THE AUDIT OFFICE

To the Director-General of Forests.

The Audit Office, acting under statutory authority, has audited the accounts of the New Zealand Forest Service for the year ended 31 December 1970.

The audit included such reviews of the accounting procedures and tests of the accounting records and other supporting evidence as were considered necessary in terms of section 20, Public Revenues Act 1953. All the information and explanations required have been obtained. The financial transactions which have come under notice have been within statutory authority.

In the opinion of the Audit Office the attached balance sheet and accompanying accounts give a true and fair view of the state of affairs of the Forest Service as at 31 December 1970 and of the results of the financial operations for the year.

G. J. Connelly,
Deputy Controller and Auditor-General.

2 June 1971.

APPENDIX 15

New Zealand Forest Service Accounts For the Year Ended 31 December 1970

(a) *General Administration Account*

Year Ended 31 December 1969			Year Ended 31 December 1970	
$	$		$	$
		Charges incurred directly in respect of—		
39,609		Fire prevention and precaution and administration of fire districts	64,931	
1,502,918		Technical investigations, research, etc.	1,815,971	
21,296		Assistance to public and private forestry	22,443	
124,156		Timber inspection and termite control	126,885	
475,444		Control of noxious animals	460,147	
268,495		Work for other departments	698,043	
353,829		Staff training, including Rotorua Training Centre	291,301	
250,409		Payments to local authorities for roading purposes (fifths)	192,856	
3,036,156			3,672,577	
288,303		*Less* fees for inspection, recoveries from other departments, etc.	667,021	
	2,747,853			3,005,556
		General administration expenses—		
2,089,824		Staff expenses, including salaries, overtime, travelling, and general expenses	2,928,255	
302,663		Office expenses, including postages, stationery, and general expenses	354,621	
313,001		Maintenance and depreciation of administrative buildings, equipment, etc.	444,679	
54,051		Miscellaneous general expenses	312,176	
2,759,539			4,039,731	
1,721,782		*Less* amounts charged against forests and other activities as "overhead"	1,834,540	
29,012		*Less* amounts charged against mills as "overhead"	2,473	
	1,008,745			2,202,718
	3,756,598			5,208,274
	26,587	*Less* miscellaneous revenue		26,727
	$3,730,011	Net deficit in Administration Account transferred to Consolidated Revenue Account in balance sheet		$5,181,547

(b) *Forest Development and Management Accounts (Excluding Waipa and Conical Hill Sawmills)*

Year Ended 31 December 1969			Year Ended 31 December 1970	
$	$		$	$
3,193,328		Establishment	3,455,326	
838,424		Tending	1,002,811	
540,706		Protection	578,802	
3,472,788		Maintenance of assets and miscellaneous expenses	4,038,322	
597,413		Depreciation of assets	765,910	
1,721,782		Overhead charged to forests and credited to General Administration Account	1,834,540	
5,431,893		Cost of utilisation	5,601,945	
	15,796,334			17,277,656
		Less—		
9,275,539		Sales of logs	11,879,470	
1,996,942		Sales of standing timber	2,360,901	
1,376,313		Miscellaneous revenue	28,048	
	12,648,794			14,268,419
	$3,147,540	Net costs transferred to "development and management" in balance sheet		$3,009,237

APPENDIX 15—continued

New Zealand Forest Service Accounts for the Year Ended 31 December 1970—*continued*

(c) *Consolidated Balance Sheet*

Year Ended 31 December 1969			Year Ended 31 December 1970	
$	$		$	$
	8,218,488	Fixed assets (at cost)— Land taken over or purchased		8,860,191
13,683,048		Buildings, including houses and camps	14,872,670	
13,992,421		Roads, bridges, tracks, etc.	15,851,837	
11,848,513		Plant and vehicles	12,766,634	
4,247,161		Other assets	4,530,003	
43,771,143			48,021,144	
12,131,458		*Less* provision for depreciation	13,123,060	
	31,639,685			34,898,084
		Development and management (net costs)—		
42,442,351		Balance as at 1 January 1970	45,589,891	
3,147,540		*Plus* net costs for the year	3,009,237	
	45,589,891			48,599,128
	638,389	Forestry Encouragement Loans		771,525
		Current assets—		
3,222,861		Sundry debtors	4,472,375	
13,000		*Less* provision for bad debts (departmental mills)	13,000	
3,209,861			4,459,375	
2,748,236		Stocks and stores (at cost)	3,113,409	
	5,958,097			7,572,784
		Intangible assets—		
	25,727,499	Interest capitalised but not charged against specific assets		27,787,025
	$117,772,049	Total assets		$128,488,737
		Capital—		
43,527,631		National Development Loans	45,756,017	
2,228,386		*Plus* net payments for year	3,312,711	
	45,756,017			49,068,728
36,152,816		Consolidated Revenue Account	40,495,020	
8,072,215		*Plus* net payments for year	9,330,201	
44,225,031			49,825,221	
3,730,011		*Less* net deficit in General Administration Account	5,181,547	
40,495,020			44,643,674	
28,342,133		*Plus* accumulated interest on National Development Loans	30,475,774	
	68,837,153			75,119,448
		Accumulated profits and reserves—		
2,150,718		Profits of Waipa and Conical Hill sawmills	2,477,650	
341,896		Fire and other reserves	350,412	
	2,492,614			2,828,062
		Current liabilities—		
152,170		Cash held on deposits	123,918	
152,170		*Less* cash held against same	123,918	
	686,265	Sundry creditors		1,472,499
	$117,772,049			$128,488,737

A. P. Thomson, Director-General.
H. J. Le Page, Chief Accountant.

APPENDIX 16

New Zealand Forest Service: Statement of Payments and Receipts for the Year Ended 31 March 1971

(a) *Payments and Receipts*

1970	Item	1971
	Payments	
$		$
224,047	Allocation of revenue: Local bodies	212,735
	General management charges—	
6,685,638	Salaries	8,203,231
2,866,522	General expenses	3,510,862
461,710	Land purchase	436,665
	Forestry projects under development and management—	
13,276,632	Exotic	14,265,420
593,091	Indigenous	888,733
7,795,485	Sawmills, etc.	8,172,969
$31,903,125	Total	$35,690,615
	Receipts	
$		$
	Indigenous forests—	
1,530,488	Sales of standing timber	1,328,158
835,232	Log sales from managed forests	1,019,570
39,485	Miscellaneous	27,675
	Exotic forests—	
2,430,274	Sales of standing timber	3,467,881
7,531,854	Log sales from managed forests	8,167,837
446,647	Miscellaneous	421,098
	Sawmills, etc.—	
3,840,080	Sawn timber	5,316,187
536,407	Treated products	436,963
3,946,336	Miscellaneous	3,277,763
428,585	Miscellaneous credits	384,891
$21,565,388	Total	$23,848,023

(b) *Sources of Finance*

1970	—	1971
$		$
8,155,261	Consolidated Revenue Account expenditure	9,772,387
168,344	*Less* receipts	170,190
7,986,917	Required from Consolidated Revenue Account ..	9,602,197
23,747,864	Works and Trading Account expenditure	25,918,228
21,397,044	*Less* receipts	23,677,833
2,350,820	Loan moneys required	2,240,395
$10,337,737	Net finance required from Government funds ..	$11,842,592

APPENDIX 17

Production of Rough Sawn Timber for the Year Ended 31 March 1971

(a) *By Species*

(Volume in thousand board feet)

Conservancy	Indigenous								Exotic				All Species			Sawmills Registered 31 March 1971
	Rimu and Miro	Matai	Totara	Kahikatea	Kauri	Tawa	Beech	Minor Species	Exotic Pines	Douglas Fir	Eucalypts	Minor Species	Indigenous	Exotic	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Auckland	16,795	2,776	1,108	1,888	1,654	607	..	378	52,211	23	558	1,243	25,206	54,035	79,241	107
Rotorua	29,895	3,764	1,988	1,562	..	6,561	18	169	328,617	44,296	491	2,166	43,957	375,570	419,527	57
Wellington ..	25,423	4,467	1,805	2,795	..	110	69	100	49,334	2,642	147	1,614	34,769	53,737	88,506	91
Nelson	10,845	72	2	512	..	2	1,379	11	30,605	2,965	20	50	12,823	33,640	46,463	65
Westland	45,001	211	29	4,667	..	..	1,161	19	226	1	..	..	51,088	227	51,315	32
Canterbury ..	27	5	4	..	..	..	..	..	49,878	905	245	293	36	51,321	51,357	57
Southland	9,893	67	79	1,306	..	..	8,660	32	25,090	1,750	12	967	20,037	27,819	47,856	48
North Island—																
1970–71	72,113	11,007	4,901	6,245	1,654	7,278	87	647	430,162	46,961	1,196	5,023	103,932	483,342	587,274	255
1969–70	73,154	14,842	5,513	7,188	1,548	10,076	387	1,106	397,521	49,348	827	5,493	113,814	453,189	567,003	284
1968–69	70,991	14,122	6,338	7,567	1,026	11,342	535	1,254	377,787	46,838	606	4,347	113,175	429,578	542,753	283
South Island—																
1970–71	65,766	355	114	6,485	..	2	11,200	62	105,799	5,621	277	1,310	83,984	113,007	196,991	202
1969–70	64,780	416	107	7,625	..	1	10,481	76	106,605	5,654	739	1,525	83,486	114,523	198,009	226
1968–69	64,936	1,300	152	8,988	..	2	10,082	86	97,824	3,665	482	2,304	85,546	104,275	189,821	239
New Zealand—																
1970–71	137,879	11,362	5,015	12,730	1,654	7,280	11,287	709	535,961	52,582	1,473	6,333	187,916	596,349	784,265	457
1969–70	137,934	15,258	5,620	14,813	1,548	10,077	10,868	1,182	504,126	55,002	1,566	7,018	197,300	567,712	765,012	510
1968–69	135,927	15,422	6,490	16,555	1,026	11,344	10,617	1,340	475,611	50,503	1,088	6,651	198,721	533,853	732,574	522

Note—(1) This table is based on statistics collected by the New Zealand Forest Service in connection with the annual registration of sawmills.

(2) Indigenous "Minor Species" (column 9) for 1970–71 include—taraire, 234,000 bd ft; tanekaha, 182,000 bd ft; hinau, 27,000 bd ft; rewarewa, 85,000 bd ft; puriri, 17,000 bd ft; other and unspecified, 164,000 bd ft.

(3) Exotic "Minor Species" (column 13) for 1970–71 include—larch, 3,089,000 bd ft; macrocarpa, 2,931,000 bd ft; poplar, 61,000 bd ft; redwood, 60,000 bd ft; other and unspecified, 192,000 bd ft.

(4) This table includes the production of sawn sleepers; 6,060,000 bd ft was produced in 1970–71.

APPENDIX 17—continued

(b) *By Land Ownership*

(Volume in thousand board feet)

Conservancy	Indigenous					Exotic				Grand Total
	State Forest Land	Unoccupied Crown Land	Maori Land	Private Land and Crown Leasehold	Total	State Forest Land	Local Authority Land	Company and Private Land	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Auckland	18,435	6	757	6,008	25,206	26,114	233	27,688	54,035	79,241
Rotorua	16,302	..	15,154	12,501	43,957	161,767	3,446	210,357	375,570	419,527
Wellington	6,327	..	13,006	15,436	34,769	10,791	1,434	41,512	53,737	88,506
Nelson	7,741	739	..	4,343	12,823	16,078	118	17,444	33,640	46,463
Westland	37,456	..	300	13,332	51,088	216	..	11	227	51,315
Canterbury	..	..	31	5	36	20,575	16,637	14,109	51,321	51,357
Southland	9,371	..	9,230	1,436	20,037	18,555	3,482	5,782	27,819	47,856
North Island—										
1970–71	41,064	6	28,917	33,945	103,932	198,672	5,113	279,557	483,342	587,274
1969–70	39,147	459	36,109	38,099	113,814	186,220	2,862	264,107	453,189	567,003
1968–69	33,128	776	41,992	37,279	113,175	165,985	3,655	260,028	429,578	542,753
South Island—										
1970–71	54,568	739	9,561	19,116	83,984	55,424	20,237	37,346	113,007	196,991
1969–70	50,630	520	6,715	25,621	83,486	49,849	23,970	40,704	114,523	198,009
1968–69	49,534	1,466	7,177	27,369	85,546	37,864	23,283	43,128	104,275	189,821
New Zealand—										
1970–71	95,632	745	38,478	53,061	187,916	254,096	25,350	316,903	596,349	784,265
1969–70	89,777	979	42,824	63,720	197,300	236,069	26,832	304,811	567,712	765,012
1968–69	82,662	2,242	49,169	64,648	198,721	203,849	26,848	303,156	533,853	732,574

APPENDIX 18

Production of Pulp and Paper in New Zealand

(Quantity in tons of 2,240 lb)

Year Ended 31 March	Woodpulp			Fibreboard	Paper and Paperboard		
	Mechanical	Chemical*	Total		Newsprint	Other Paper and Paperboard	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1964 ..	188,290	181,197	369,487	29,229	168,005	128,018	296,023
1965 ..	203,372	193,029	396,401	31,736	184,317	126,809	311,126
1966 ..	217,743	193,181	410,924	33,771	195,606	153,548	349,154
1967 ..	205,345	223,860	429,205	32,878	183,886	170,435	354,321
1968 ..	221,159	252,442	473,601	33,075	195,546	175,931	371,477
1969 ..	230,975	255,000	485,975	38,288	199,530	189,994	389,524
1970 ..	241,110	311,882	552,992	39,553	204,137	234,816	438,953
1971 ..	254,858	312,065	566,923	43,653	210,538	244,048	454,586

*Includes semi-chemical pulp.

APPENDIX 19

New Zealand Production of Forest Products in Roundwood Equivalent and Actual Roundwood Removals for the Year Ended 31 March 1971

(Volume in million cubic feet)

Category	Indigenous Wood	Exotic Wood	Total
(1)	(2)	(3)	(4)
Logs for export	0.4	66.2	66.6
Chips for export	0.5	6.6	7.1
Sawn timber	31.3	118.9	150.2
Pulp and pulp products	2.5	78.0	80.5
Peelers, veneer, and plywood	0.8	1.8	2.6
Smallwood and miscellaneous	0.3	13.9	14.2
Total (roundwood equivalent)	35.8	285.4	321.2
Less waste used in pulp production—			
Sawmill residues	..	26.4	26.4
Waste paper	..	5.4	5.4
Total actual roundwood removed—			
1970–71	35.8	253.6	289.4
1969–70	36.5	239.5	276.0
1968–69	36.1	207.2	243.3
1967–68	37.5	184.6	222.1

Note—(1) Smallwood and miscellaneous is partly estimated. (2) Firewood is excluded.

APPENDIX 20

External Trade of New Zealand in Forest Products

(a) *Imports of Timber*

Calendar Year	Sawn Timber							Total Sawn Timber	Sleepers	Logs and Poles
	Hardwoods			Softwoods						
	Australian	Oak	Other	Douglas Fir	Redwood	Cedar	Other			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	(Volume in thousand board feet)									Thousand cu ft
1965 ..	6,348	172	8,198	4,806	5,456	9,541	701	35,222	2,143	772
1966 ..	7,636	141	5,879	4,957	4,183	12,587	1,672	37,060	2,238	689
1967 ..	5,651	12	4,671	3,430	2,944	7,464	1,556	25,728	10	569
1968 ..	4,123	96	2,939	2,044	1,590	4,628	950	16,370	114	515
1969 ..	4,197	72	4,576	1,781	3,022	4,836	781	19,265	27	467
1970 ..	4,391	102	6,670	2,684	1,815	4,958	327	20,948	2	506
	(Value in $(000))									
1965 ..	766	28	934	414	590	1,132	106	3,970	188	542
1966 ..	960	22	712	458	396	1,424	248	4,220	196	424
1967 ..	725	3	510	300	294	826	213	2,871	..	335
1968 ..	633	17	417	283	221	707	142	2,420	17	366
1969 ..	682	19	721	307	576	949	149	3,403	4	345
1970 ..	737	33	1,251	499	368	1,127	62	4,077	..	674

(b) *Exports of Timber*

Calendar Year	Indigenous			Exotic					Total Sawn Timber	Sleepers	Logs and Poles
	Beech	Other	Total	Radiata Pine		Douglas Fir	Other	Total			
				Sawn	Cases						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	(Volume in thousand board feet)										Thousand cu ft
1965 ..	203	56	259	28,692	3,727	4,326	74	36,819	37,078	23	15,654
1966 ..	61	19	80	27,616	959	3,100	111	31,786	31,866	..	18,975
1967 ..	68	438	506	32,236	2,134	4,397	321	39,088	39,594	..	28,106
1968 ..	338	3,766	4,104	63,640	2,913	20,193	197	86,943	91,047	..	50,882
1969 ..	447	3,766	4,213	74,400	2,423	24,887	549	102,259	106,472	14	59,032
1970 ..	1,834	3,871	5,705	76,825	2,020	25,704	2,831	107,380	113,085	..	64,294
	(Value in $(000))										
1965 ..	26	8	34	1,748	410	334	8	2,500	2,534	..	3,996
1966 ..	8	4	12	1,706	106	232	10	2,054	2,066	..	4,744
1967 ..	4	63	67	1,982	223	343	24	2,572	2,639	..	7,120
1968 ..	50	548	598	4,130	490	2,147	13	6,780	7,378	..	16,507
1969 ..	67	520	587	5,283	139	2,797	80	8,299	8,886	2	22,550
1970 ..	229	761	990	6,218	250	2,920	320	9,708	10,698	..	24,830

Source: Department of Statistics; prepared by the New Zealand Forest Service.

Note—The basis for valuation is: imports, c.d.v.; exports, f.o.b.

APPENDIX 20—continued

EXTERNAL TRADE OF NEW ZEALAND IN FOREST PRODUCTS—*continued*

(c) *Imports of Pulp and Paper*

Calendar Year	Woodpulp	Fibreboard	Paper and Paperboard		
			Newsprint	Other Paper and Paperboard	Total
(1)	(2)	(3)	(4)	(5)	(6)
	(Quantity in tons of 2,240 lb)				
1965	16,622	235*	4,001	32,323	36,324
1966	22,180	215*	2,026	25,406	27,432
1967	21,397	55*	776	19,030	19,806
1968	10,247	172*	677	24,130	24,807
1969	10,902	36*	775	18,460	19,235
1970	18,562	119*	486	27,715	28,201
	(Value in $(000))				
1965	1,528	8	432	7,912	8,344
1966	1,944	10	222	7,462	7,684
1967	1,887	4	83	5,988	6,071
1968	987	8	109	7,834	7,943
1969	1,235	1	123	8,987	9,110
1970	3,260	3	80	10,150	10,230

(d) *Exports of Pulp and Paper*

Calendar Year	Woodpulp	Fibreboard	Paper and Paperboard		
			Newsprint	Other Paper and Paperboard	Total
(1)	(2)	(3)	(4)	(5)	(6)
	(Quantity in tons of 2,240 lb)				
1965	54,042	2,956*	109,513	861	110,374
1966	74,269	3,856*	110,670	2,397	113,067
1967	72,705	3,712*	107,681	3,804	111,485
1968	92,547	11,813*	117,701	17,448	135,149
1969	78,621	20,596*	118,438	26,872	145,310
1970	96,038	15,462*	116,705	26,032	142,737
	(Value in $(000))				
1965	4,702	104	11,434	172	11,606
1966	6,148	150	11,482	420	11,902
1967	5,911	154	12,091	613	12,704
1968	6,864	431	16,093	2,490	19,014
1969	6,746	725	15,769	3,635	19,404
1970	9,127	653	15,276	4,521	19,797

*In thousand square feet.

Source: Department of Statistics; prepared by the New Zealand Forest Service.

NOTE—(1) "Other Paper and Paperboard" excludes manufactures of paper and paperboard; values of "Other Paper and Paperboard" include minor items for which no quantities are given.

(2) Basis for valuation: imports, c.d.v.; exports, f.o.b.

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